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Issue #61 July 1991

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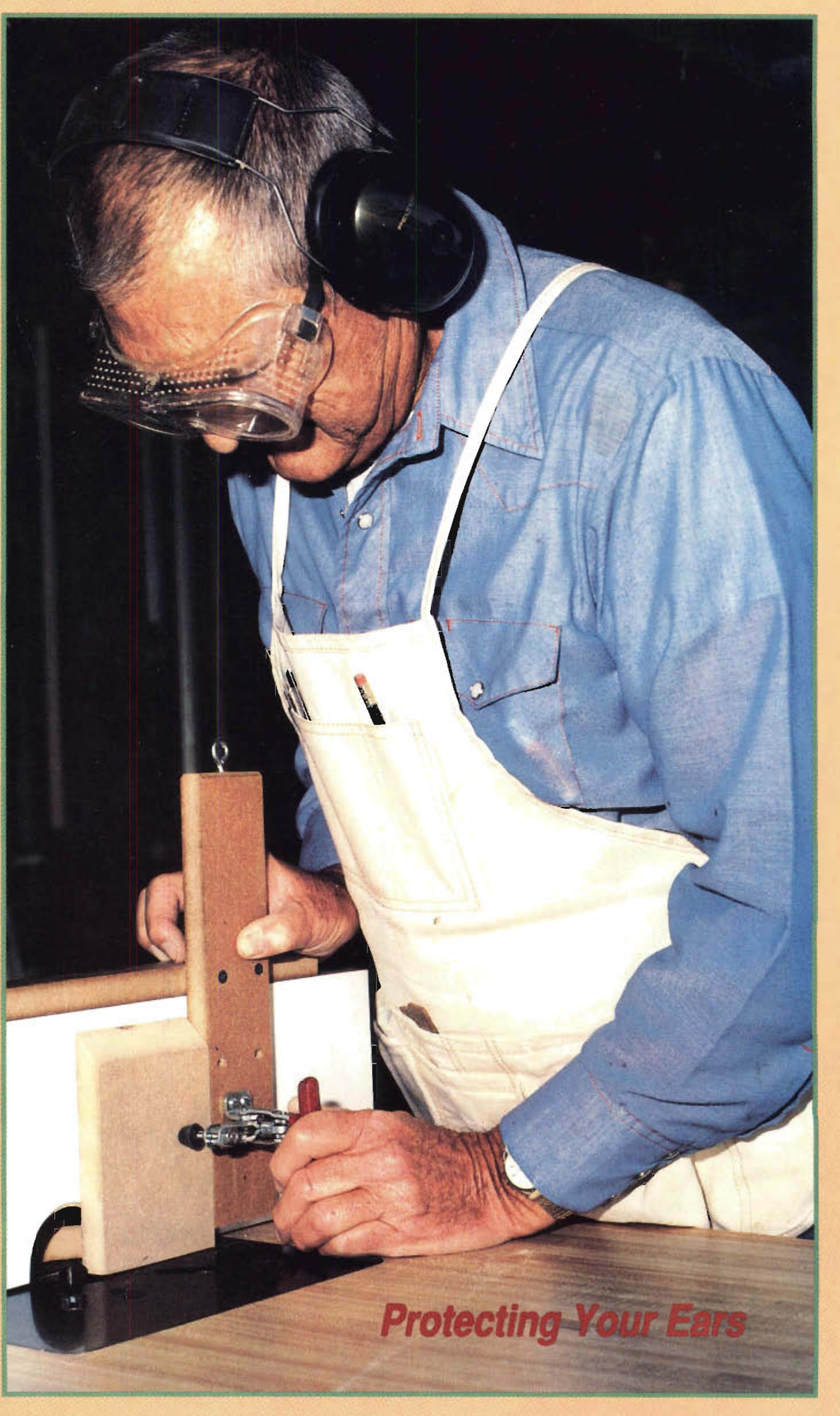

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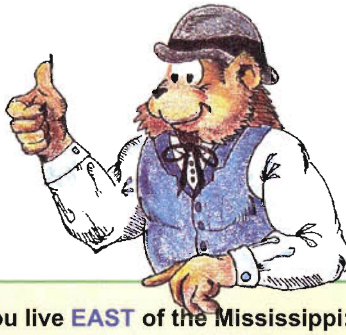

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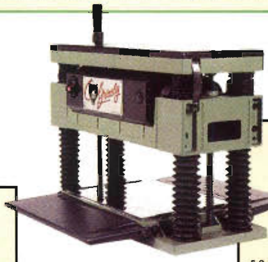

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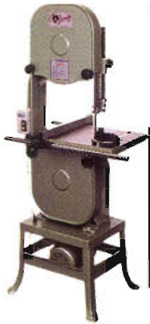

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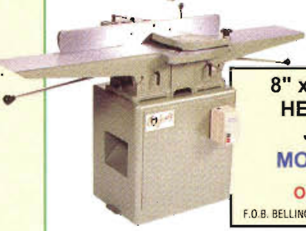

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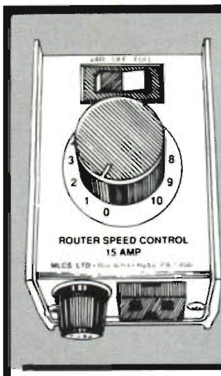

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|---|---|---|---|---|---|---|---|
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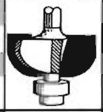
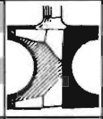
| #602 | | 3/16" Spiral Cutter | | 3/16" | 5/8" | 1/4" * | $12.00 |
| #603 | **Solid Carbide** | 1/4" Spiral Cutter | | 1/4" | 3/4" | 1/4" | $12.00 |
| #903 | | 1/4" Spiral Cutter | | 1/4" | 3/4" | 1/2" * | $12.00 |
| #904 | | 3/8" Spiral Cutter | | 3/8" | 1" | 1/2" * | $24.00 |
| #905 | | 1/2" Spiral Cutter | *Proper Adaptor Will Be Supplied | 1/2" | 1 1/2" | 1/2" | $29.00 |
| #350 | | 1/8" **Round Over** | 1/8" R | 3/4" | 3/8" | 1/4" | $11.00 |
| #351 | | 3/16" Round Over | 3/16" R | 7/8" | 1/2" | 1/4" | $11.00 |
| #230 | | 1/4" Round Over | 1/4" R | 1" | 1/2" | 1/4" | $12.00 |
| #353 | | 5/16" Round Over | 5/16" R | 1 1/8" | 1/2" | 1/4" | $14.00 |
| #209 | | 3/8" Round Over | 3/8" R | 1 1/4" | 5/8" | 1/4" | $15.00 |
| #355 | | 1/2" Round Over | 1/2" R | 1 1/2" | 3/4" | 1/4" | $17.00 |
| #656 | | 3/4" Round Over | 3/4" R | 2" | 7/8" | 1/2" | $21.00 |
| #199 | | **Multiform Moulding** | Unlimited Patterns | 2 1/4" | 2" | 1/2" | $40.00 |
| #340 |  | 1/8" **Cove** | 1/8" R | 5/8" | 3/8" | 1/4" | $12.00 |
| #205 | | 1/4" Cove | 1/4" R | 1" | 1/2" | 1/4" | $12.00 |
| #206 | | 3/8" Cove | 3/8" R | 1 1/4" | 9/16" | 1/4" | $13.00 |
| #207 | | 1/2" Cove | 1/2" R | 1 1/2" | 5/8" | 1/4" | $14.00 |
| #208 | | 3/4" Cove | 3/4" R | 1 7/8" | 3/4" | 1/2" | $26.00 |
| #460 |  | 1/4" **Bull Nose** | 1/4" Dia. of Circle | | 3/8" | 1/4" | $14.00 |
| #461 | | 3/8" Bull Nose | 3/8" Dia. of Circle | | 3/4" | 1/4" | $15.00 |
| #462 | | 1/2" Bull Nose | 1/2" Dia. of Circle | | 7/8" | 1/4" | $16.00 |
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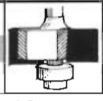
| #507 | | 5/8" Pattern | Flush Trim | 5/8" | 1" | 1/4" | $16.00 |
| #508 | | 3/4" Pattern | Flush Trim | 3/4" | 1" | 1/4" | $17.00 |
| #366 |  | 1/8" **Slot Cutter** | 3/8" Deep | 1 1/4" | 1/8" | 1/4" | $14.00 |
| #368 | | 1/4" Slot Cutter | 3/8" Deep | 1 1/4" | 1/4" | 1/4" | $14.00 |
| #204 | | 3/8" Rabbeting | 3/8" Deep | 1 1/4" | 1/2" | 1/4" | $13.00 |

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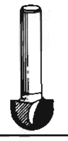
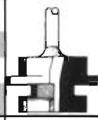
| #210 |  | 1/4" **Core Box** | round nose | 1/4" | 1/4" | 1/4" | $ 9.00 |
| #211 | | 3/8" Core Box | round nose | 3/8" | 3/8" | 1/4" | $10.00 |
| #212 | | 1/2" Core Box | round nose | 1/2" | 11/32" | 1/4" | $13.00 |
| #418 | | 3/4" Core Box | round nose | 3/4" | 5/8" | 1/4" | $15.00 |
| #213 | | 1" Core Box | round nose | 1" | 3/4" | 1/2" | $17.00 |
| #214 | | 1/4" **Straight** | plunge cutting | 1/4" | 3/4" | 1/4" | $ 6.50 |
| #215 | | 5/16" Straight | plunge cutting | 5/16" | 1" | 1/4" | $ 6.50 |
| #216 | | 3/8" Straight | plunge cutting | 3/8" | 1" | 1/4" | $ 6.50 |
| #217 | | 7/16" Straight | plunge cutting | 7/16" | 1" | 1/4" | $ 6.50 |
| #474 | | 1/2" Straight | plunge cutting | 1/2" | 1" | 1/4" | $ 7.00 |
| #775 | | 1/2" Straight | plunge cutting | 1/2" | 2" | 1/2" | $14.00 |
| #218 | | 5/8" Straight | plunge cutting | 5/8" | 1" | 1/4" | $ 7.00 |
| #219 | | 3/4" Straight | plunge cutting | 3/4" | 1" | 1/4" | $ 9.50 |
| #220 | | 1" Straight | plunge cutting | 1" | 1 1/2" | 1/2" | $11.00 |
| #500 | | 3/8" **Flush** | **Trimming** | 3/8" | 1/2" | 1/4" | $ 7.00 |
| #502 | | 1/2" Flush | Trimming | 1/2" | 1/2" | 1/4" | $ 7.50 |
| #503 | | 1/2" Flush | Trimming | 1/2" | 1" | 1/4" | $ 8.50 |
| #221 | | 1/2" Flush | Trimming | 1/2" | 1 3/16" | 1/2" | $ 8.00 |
| #545 |  | **Tongue & Groove** | Straight | 1 5/8" | 1" | 1/4" | $29.00 |
| #845 | | Tongue & Groove | Straight | 1 5/8" | 1" | 1/2" | $29.00 |
| #546 | | Tongue & Groove | Wedge | 1 3/16" | 1" | 1/4" | $29.00 |
| #846 | | Tongue & Groove | Wedge | 1 5/8" | 1" | 1/2" | $29.00 |
| #450 | | 1/8" **Beading** | 1/8" R | 3/4" | 3/8" | 1/4" | $11.00 |
| #451 | | 3/16" Beading | 3/16" R | 7/8" | 1/2" | 1/4" | $11.00 |
| #233 | | 1/4" Beading | 1/4" R | 1" | 1/2" | 1/4" | $13.00 |
| #453 | | 5/16" Beading | 5/16" R | 1 1/8" | 1/2" | 1/4" | $14.00 |
| #454 | | 3/8" Beading | 3/8" R | 1 1/4" | 5/8" | 1/4" | $15.50 |
| #455 | | 1/2" Beading | 1/2" R | 1 1/2" | 3/4" | 1/4" | $17.00 |
| #530 | | 3/16" **Edge Beading** | 3/16" Dia. of Circle | | 1/2" | 1/4" | $15.00 |
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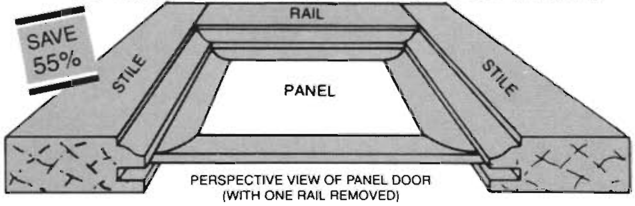

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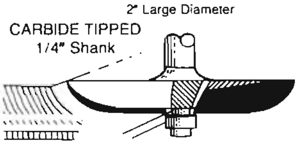

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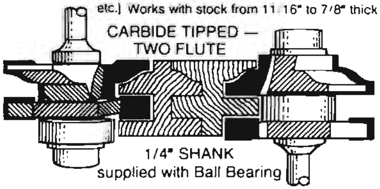

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# On the Cover

**Hugh Williamson** of Tucson, Arizona wears hearing protection whenever he's running a machine or a power tool in his woodshop; in his article "Don't Go Deaf in Your Shop" (page 69), he explains why you should, too. Besides building fine things like the Trastero and the Spanish Bookcase projects (on page 56), Hugh is a doctor, so you can be sure he's giving sound advice.

Laurie Williamson

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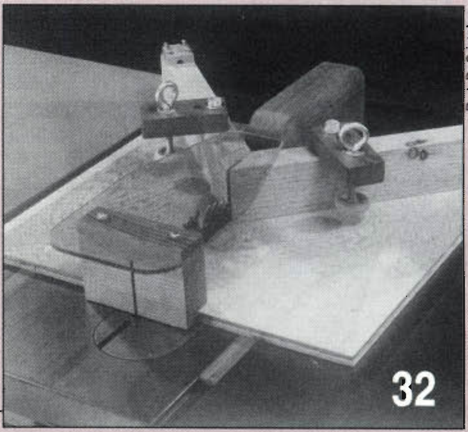
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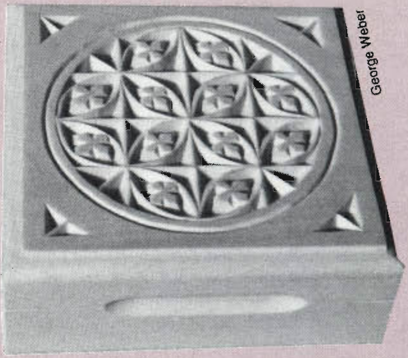
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# Clear Cuts

I've discovered some interesting new things lately—tools and hardware from worlds I haven't explored yet. Not from a separate universe, like say... electronics repair, or the tools of science. I'm talking closer to Earth, like the mulching machine I rented the other day. I needed to chew up the branches of a 20–year–old tree that was killed in the frost this year. This simple outdoor garbage disposal got me thinking about how there's a tool for nearly any job.

There's hardware, too. We just accepted a *Tricks of the Trade* item for a future issue that requires a spring. It's a good idea that I wanted to adopt in my shop, so I had springs on my mind when I was in the hardware store. I guess I should have expected it, but I was amazed at how many different springs there are for the choosing. I saw columns of pegboard hooks, loaded with little bags of two and four springs. Springs that pull, springs that push, coil or uncoil, springs that bend in different directions. There were packets of springs in large quantities—100 of them all the same. And there was the prize packet, the one I walked out with: the *assortment*. It was fun just to dump them out on my workbench and imagine some of the things I might do with them. It will be fun to dump them out and use them, now that I have them.

If you identify with any of this at all, but you don't have a big, neat, old hardware store with fascinating nooks and crannies in your neighborhood, you might want to get a copy of the Century Spring Corp's catalog. Their address is: PO Box 15287, Los Angeles, CA 90015. But if you're lucky enough to have a wonderland like I do, there's no telling what you can find.

Once in a while we balk when we receive a project article that involves another "craft," like metalworking or sewing. But if you think about it, these activities simply require the right tools. There's a section in the hardware store (or sometimes a separate store) devoted to those other pursuits.

We looked at a project article recently that involved making your own knock–down hardware. You'd need 1/2" diameter steel rod (you'll find it next to the dowels—it's been there all along). You'd cut it to length (hacksaw...with the other handsaws), drill a hole and thread it to receive a bolt. That'll require the right size tap; they're with the drill bits, and the package will tell you the right size drill bit to grab while you're there. It would also help to have a vise and a center punch if you don't already...and a drill press would really simplify things. We didn't accept the article because of design problems, but you could go ahead and buy these tools anyway... Once you've got a tool, you've got a new capability.

Some of you may have a thorough background in the trades that I've described here as alien, but you know what I mean. There are worlds *you* haven't explored, some you might even feel lost in. But whether you work with your hands for a living, or for fun, or just to keep your yard nice, you know the pleasure to be found in having the right materials and using the right tool. Chances are, the tool's out there, and you can probably learn how to use it.

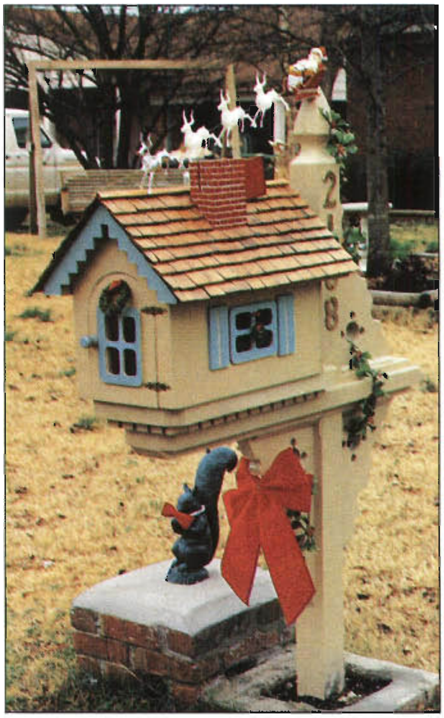
David M. Camp

# Letters

**We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.**

## More Mailbox Mail

In your September issue (PW #56) you pictured a mailbox made of plywood. I built it, and my wife liked it so much, she had to have the post also. We ordered the back issue (#55) to get the drawings for the mailbox post.



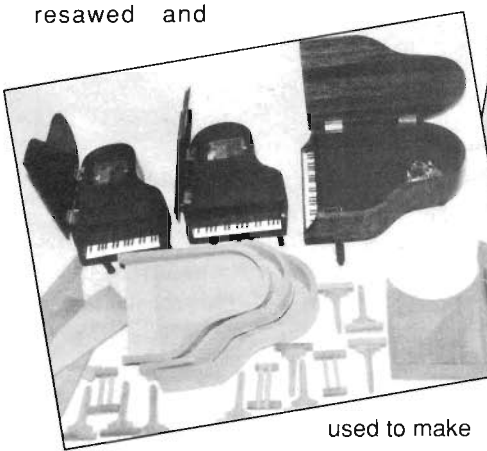
As you can see, one picture is worth a thousand words. We love it; everyone loves it. Thank you for such a good publication.

Frank DuBose, Southhaven, MS

## Piano Production

I found the "Piano Music Box" article (PW #56) to be interesting and decided to make one. I used white pine 2 X 4 scrap glued together to obtain the proper width for the body. Since I don't have a scroll saw, I cut out the body on the band saw. I used 1⁄8" plywood for the cross pieces, lid and bottom. The keys were made from 3⁄32" square balsa wood cut to length and painted black. I gave the piano many coats of primer and black paint, sanding between coats.

The piano turned out so well that I decided to make three more as Christmas gifts. I showed them to a friend who said his wife would like a mahogany one. So I bought some mahogany and started cutting out bodies concentrically, getting three gradually smaller pianos from the same piece. The remaining scraps were resawed and used to make lyres, legs and bottoms. I made the lids from ¼" mahogany stock. Since a natural finish was preferred by the people who saw them, I used a clear varnish. They got such a positive response, I ended up making a total of fourteen. I gave all but two away as Christmas gifts. The photo above shows three completed pianos and the parts (and scrap) for three more.



The completed pianos cost an average of $10.00 each for materials including musical movements from Klockit (1-800-KLOCKIT). I was hoping to reduce my labor time enough to make it profitable to sell some, but this was not possible without sacrificing quality. I did have an enjoyable time making them.

Florent P. Baecke, San Antonio, TX

## Rock Storage

Enclosed is a photo of the 10–drawer cabinet I made for my son's mineral/rock collection. Your Issue #58 (January, 91) came right as I was designing it. I used the drawer design in Link Lincoln's "How to Build Shop Cabinets" article. I figured if the design is strong enough to hold heavy tools it should be strong enough for rocks.

I built it as a one–column unit, 24"w X 16"d X 48"h. I used birch plywood for exposed surfaces, and stained it with Minwax Early American followed by two coats of Deft semi–gloss lacquer.

I think it turned out pretty good for an inexperienced do-it-yourselfer. I really appreciated the article.

Warren Dickert, Greenville, TX

## No Tool Like an Old Tool

As a dealer in old tools, I particularly enjoyed Issue #58. Like Rick Hartom's Timeless Tools store, we specialize in older tools. Our range is probably less the American mainstream, as our sources come largely from the English furnituremakers of the past. We get the occasional axe as Rick has, but the *Tried and True* piece "Block, Miter, Bullnose and Chariot Planes" is more our forte.

I disagree with Graham that the double–ended block plane should be reserved for quality cabinet work; this one is a great plane to toss in a light bag and carry to a jobsite for the unexpected bit of trimming.

Also in that issue was a discussion of making a chamfer plane. True, a block plane will cut chamfers; what this plane does is produce a consistent width and angle of chamfer from stick of wood to stick of wood. This is essential if you are mitering them around something as an edging. In making the plane, the author was uncertain how to orient the grain; all the older ones have the outside of the tree as the sole. This gives both the best wear, and also the most stability in the plane.

Graham Blackburn is so right when he says that old specialist tools will do special tasks much better than today's more universal tools. They also just feel so good to use. These tools were developed over hundreds of years of experimentation to do specific jobs well and fast. My company makes new versions of some, and we offer them in addition to our old tools for furniture and cabinetwork. A subscription to our catalog is $20 for five issues (about a years' worth—our inventory is always changing). Readers should also keep their eyes open at garage sales and flea markets because many of these "antiquated" tools will do a very modern job more quickly than their supposed replacements.

Dr. Charles Stirling, Bristol Design Ltd.
14 Perry Road, Bristol, BSI 5BG,
England

## A Craftsman's Pride

I especially liked most of Joe Beals' article in the March issue (*The Business End*, "Notes from the One Man Shop," *PW* #59). I could equate with some of his frustrations with customers.

However, I take exception to his statement to the effect that craftsmen in the other trades lack any dedication or pride in their work. This is not true from my experience in 37 years in the building trades.

Mr. Beals makes a pretty broad statement about a group. It's like saying all cabinetmakers are artisans—which, of course, is false. I have seen some mighty poor work done by so–called cabinetmakers.

I always feel a sense of pride when I finish a job. I know I have done my very best as a craftsman, and my end result will give pleasure long after I'm gone.

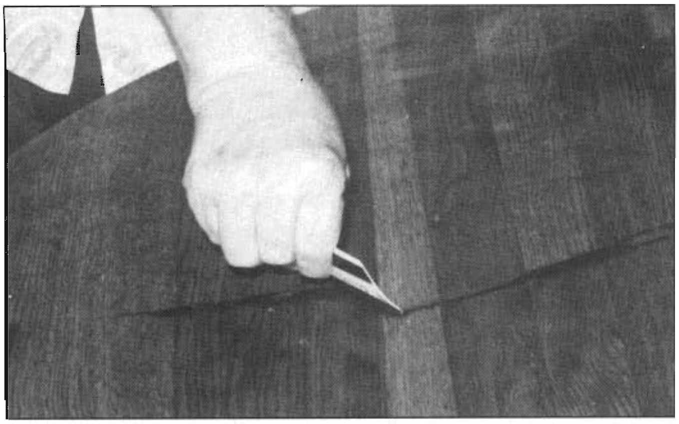
Clyde A. Heineman, Wheeling, IL
Tile–setter and remodeler for 37 years

# Tricks of the Trade

**Tricks of the Trade shares readers' tips for making woodworking tasks easier and safer. Send yours to Tricks of the Trade, c/o *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. We pay $25 for each trick we publish. In this issue we've devoted the whole column to tips by Alice and Robert Tupper, husband and wife woodworkers in Canton, SD.**

## Credit Card Squeegee

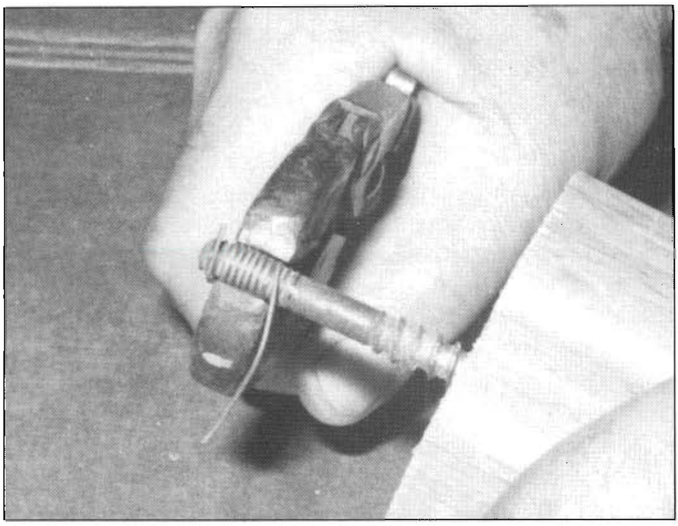
Expired plastic credit cards make good squeegees for removing excess wood filler. The edges are flexible, the corners are rounded, they're easy to clean, and they're a comfortable size.



Excess filler can easily be returned to the can. After squeegeeing, use burlap or a coarse cloth across the grain; then hand rub the surface with the grain to pack the filler.

## Bolt Thread Protection

Ever need to use pliers to grasp the threaded end of a hanger bolt in order to turn the bolt fully in? Wind some light wire in the threads first. After you've turned the bolt, unwind the wire and the threads will still be in good shape.



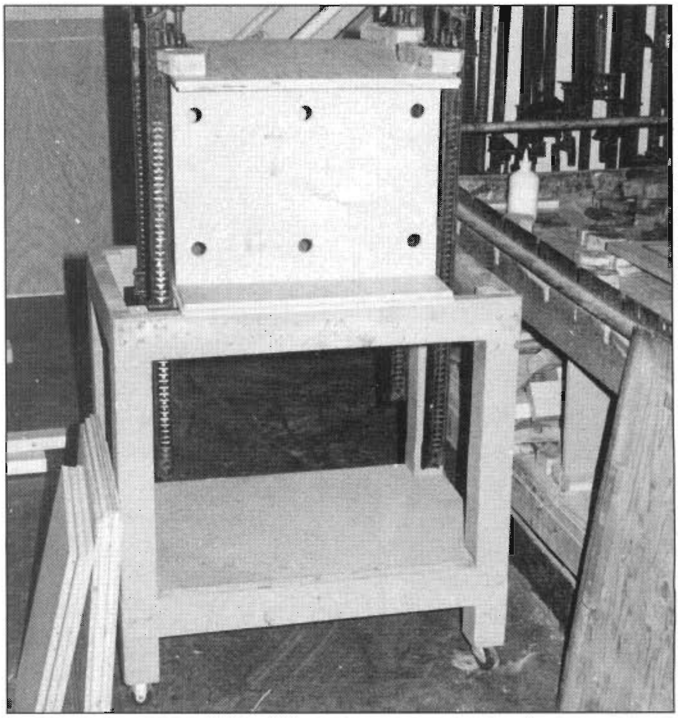
author

## Stripping Tip

Press a cut-open plastic garbage bag down over fresh paint remover when you're stripping furniture. The pastic slows down evaporation and saves on coats of remover. The plastic covered areas wrinkle up in a short time and clean off with a wide plastic putty knife and burlap.

## Utility Cart

We made our shop utility cart with a loose–fitting, removable top. When it's used as a clamping table, the side rails support the project, and there's room for the clamps to extend below it. With the top in place, the cart can carry material between workbenches and machines.



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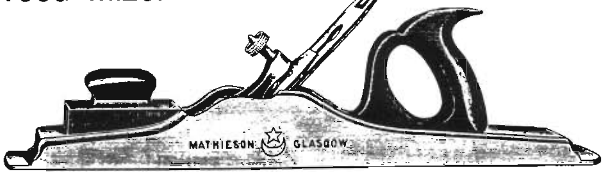

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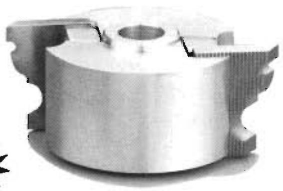
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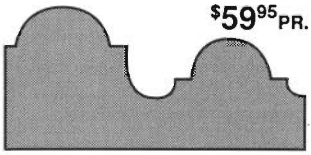
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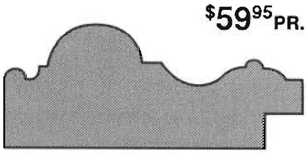
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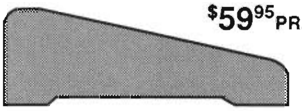
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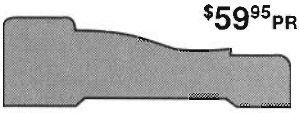
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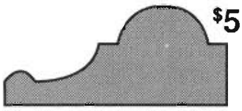
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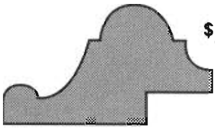
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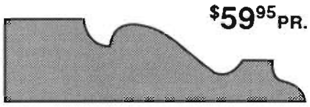
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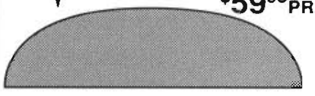
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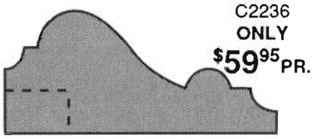
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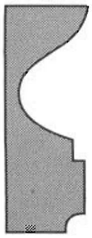
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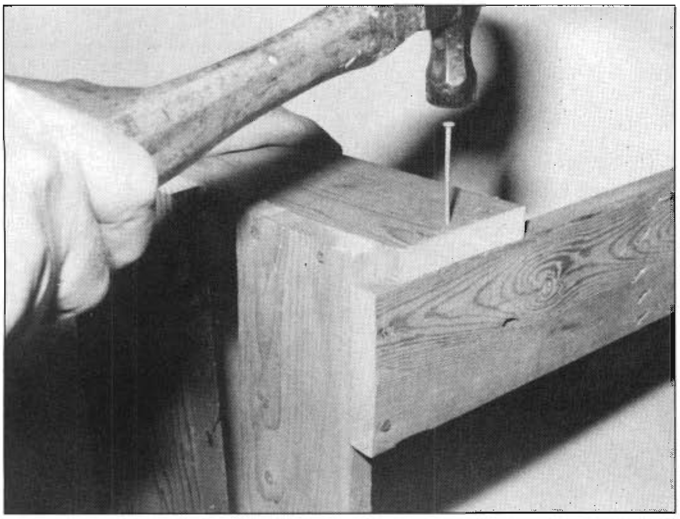
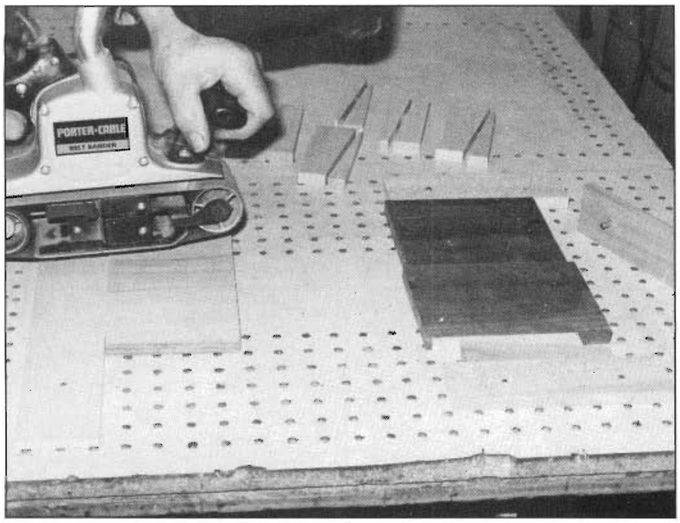
## Crate Construction Hint

If you need to crate an item, especially something heavy, try nailing the corners as shown here. This crate corner will not come apart during shipment. The nails through the ends of the pieces hold in side grain, not end grain material. Each piece is held in the corner by the other two pieces. You must use a nail puller to take the corner apart without breaking the wood.



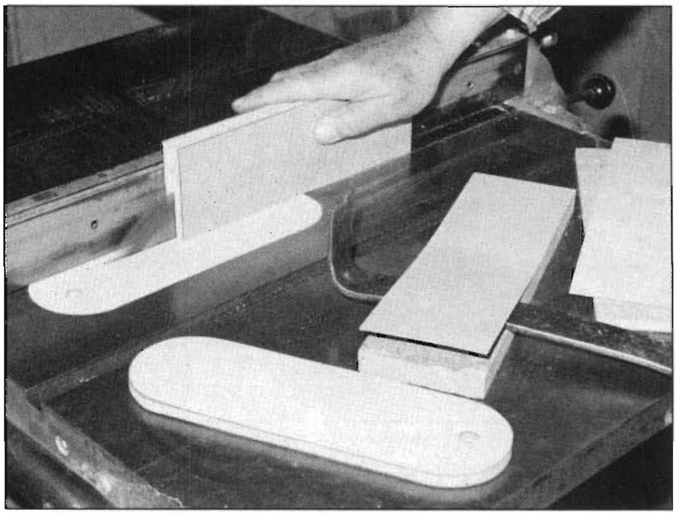
## Bench Top Clamp

The top of this workbench is made from a plastic laminate sink cutout and a piece of ¾" plywood. The top is tough, glue doesn't stick to it, and spilled finish is easy to clean up. The ¼" holes through the sink cutouts were located by drilling through a layer of ¼" pegboard. I made stop cleats of ½" X 2" X 7½" sycamore. They're held in place by 1¼" lengths of 3⁄16" dowel rod. The cleats are easy to position at right angles to each other, or as stops anywhere on the drilled out area. One ½" X 2¼" X 20" stop with two dowel holders acts as a stop for material being sanded with the belt sander. I can also use it on the end of the bench when sanding long pieces. I cut ½" thick sycamore blocks 5" long and of assorted widths at a 10° angle. Combinations of these wedge-shaped pieces help in clamping stock between cleats on the bench top.



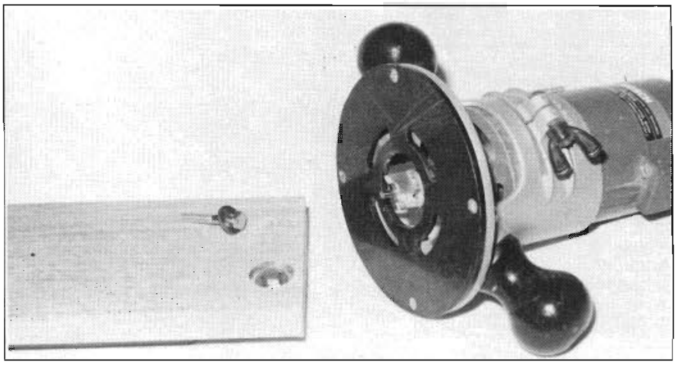
## Table Saw Inserts

Countertop sink cut–outs are often discarded by installers, and can sometimes be had for the asking. Cut pieces ¼" longer and wider than your table saw opening to make slick, smooth–sliding inserts. Set the rip fence to cut the thickness you need, less the thickness of the plastic laminate. Then peel some off from another part of the cut–out, and use it as a facing for the underside of the split pieces. After the contact cement has set, trim the inserts to the exact shape. To cut the blade opening, lower the blade all the way and put the insert in position. Slide the rip fence partially over it, lock it, and with a thin slip of wood, wedge the insert tightly in place. Then start the saw and raise it slowly to the maximum depth of cut. Moulding cutters and dadoes can be raised to the precise depth needed for the job so that the insert will support the stock fully and curtail chip–out.



## Countersunk Bolt Heads

You can make a very clean, flat-bottomed counterbore for nuts or bolt heads by using a router with a rabbeting bit. Drill the hole for the bolt and use it as a guide for the router bit tip. Set the depth of cut deep enough to hide the bolt head.



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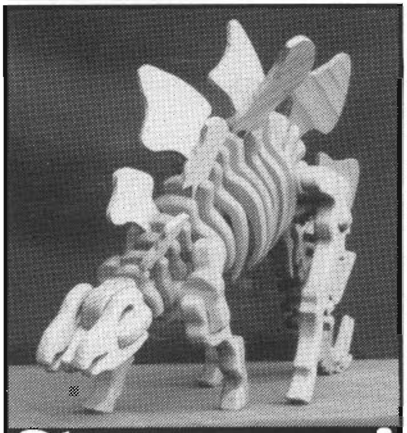

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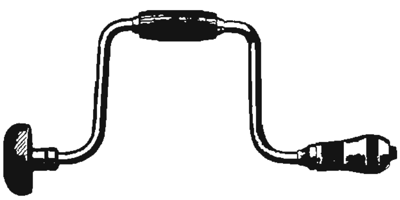

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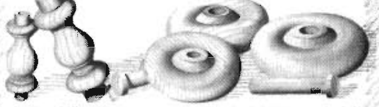

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| | | |
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| 1" x 3/8" Heart | $ 6.50 / 100 | $ 5.00 |
| 1-1/2" x 1/8" Heart | $ 7.00 / 100 | $ 6.00 |
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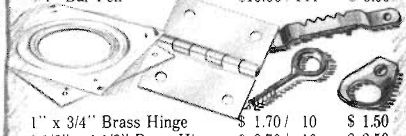

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|---|---|---|
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by Ken Sadler

# Money In Your Pocket

Why run your own business? If you're like me, there are several reasons: I want to be my own boss, I enjoy the work, and I think I can create something worthwhile. But the underlying reason is that I want to make money—more than just a living. To make that kind of money takes good management and that means knowing what's happening in your business as soon as it happens. After product and sales, the most important element in any business is how the money comes in and goes out. To keep on top of what's happening to your money you need cost analysis.

What is cost analysis? Simply put, it is the process of looking at and comparing the income and outgo of your business to find out what you are doing right and what you are doing wrong. Cost analysis is based on the simple fact that your total sales minus your total costs is your profit. This presupposes that you have included all your costs. Many people don't. For example, if you don't pay yourself a salary or wages, but take your living from the profit, then the money you pay yourself is not included in the cost of running the business and therefore the costs are not true. If the costs are not true, then the prices you set based on them are not true either. In the end you wind up with no profit, just wages. There is an old maxim, "Salary or wages are to live on, and profits are to grow on." You must have both to have a successful business.

Some businesses have outside accountants that do their books. Unfortunately, many accountants don't go beyond straight double-entry bookkeeping. This kind of accounting by itself will not give you the information you need to run your business properly. However, the cost system I'm going to explain is not your total bookkeeping system either, it is an addition to your system.

In order to do a cost analysis, you first have to collect the figures. Collecting and recording the figures can be a tedious job which many people eventually shirk, with the result that their system breaks down. In devising a system, the idea is to keep it as simple as possible. How simple you can keep it will depend on the type of business you're running. In woodworking, there are basically three types of shops: the custom (one–of–a–kind) shop, the semi–production shop, and the built–in cabinet shop. The last is a special case because it usually requires you to build the cabinets in your shop and then install them in the customer's home. This tends to complicate the cost–keeping. I will try to outline some ideas for simple systems to cover each of these types of shop.

In all three cases, there are basic records you must set up: a Job Cost Record, a Cost Spreadsheet, and a Profit & Loss Statement. The last two should be set up on a monthly or quarterly basis depending on the volume of business you do. In the custom shop, where you're working alone or with a couple of helpers, you can dispense with the Job Cost Record because you're usually only working on one job at a time, so all costs can be allocated to that job.

The Cost Spreadsheet is your worksheet. On it you enter any money you take in or spend *at the time you get it or spend it.* Record from whom it came or to whom it went, and for what. Figure 1 shows a typical Cost Spreadsheet for the first quarter of 1991. The headings should be chosen to fit your operation. Every penny coming or going, whether it is in the form of cash or check, must be recorded. This is the tedious part, but you can make it easier by choosing one day of the month—say the 10th—to pay bills. Since payments are usually the biggest number of entries,

**Figure 1. Sample Cost Spreadsheet**

| Date | Name | SALES | | Admin |
|---|---|---|---|---|
| | | Furniture | Accessories | Expens |
| 1/10/91 | Betty Lou Bennet | $110.00 | | |
| 1/16/91 | United Telephone Co. | | | |
| | Portland Gen. Elect. | | | |
| | Mac Gas Co. | | | |
| | Saw Repair & Supply | | | |
| 1/21/91 | Mr. & Mrs. Alexander | $800.00 | | |
| 1/30/91 | My Wages | | | |
| 2/12/91 | Winks Hardware | | | |
| | Jones Photo | | | $8.50 |
| | Mac Gas Co. | | | |
| | United Telephone Co. | | | |
| | Portland Gen. Elec. | | | |
| 2/15/91 | G. H. Finger | $2500.00 | | |
| 2/20/91 | Mahurin Lumber Co. | | | |
| | Winks Hardware | | | |
| 2/25/91 | D. B. Cooper | $650.00 | | |
| | Lawrence Gallery | $925.00 | | |
| 2/28/91 | My Wages | | | |
| 3/5/91 | Shell Oil Co. | | | |
| 3/10/91 | Postmaster | | | |
| | United Telephone Co. | | | |
| | Portland Gen. Elec. | | | |
| | Mac Gas Co. | | | |
| | Woodcraft Supply Co. | | | |
| 3/15/91 | Frances Diemoz | | $75.00 | |
| | Jones, Day, Reavis | | | |
| 3/31/91 | My Wages | | | |
| | **1st Quarter Totals** | $4985.00 | $75.00 | $8.50 |

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***Ken Sadler** is a retired furnituremaker in Portland, Oregon. He also served for four years as a counselor with the Service Corps of Retired Executives (SCORE), a volunteer organization that advises small businesses through the Small Business Association.*

it will all be done at one time and not take time during the rest of the month.

If you keep your entries on the Cost Spreadsheet up to date, the rest is simple. For the custom shop, a quarterly P & L Statement is best, so at the end of each quarter, total the columns on the Spreadsheet, and put those totals into the P & L Statement form. If you have been faithful in your record–keeping, you should be able to do this within a couple of days of the end of the quarter. Keep in mind that if something is wrong, the sooner you know it, the sooner you can correct it. Figure 2 shows a P & L Statement form filled out. It is set up soeach quarter can be posted next to the preceding one. This is very important as you will see.

Up to this point, it's all been record–keeping; now it's time for analysis. The P & L Statement will tell you if you made or lost money and how much. If you have lost money or not made as much as you thought you should have, there has to be a reason. The analysis helps you find that reason.

Let's assume you haven't made what you expected. First look at the costs. Study each one, and decide if it's reasonable. If it seems to be high, go back to the Spreadsheet and look at the details of that cost. What went into the total? Was there one item that was out of line; if so, why? If several items don't look right, perhaps prices in that particular area have gone up; check to see. If they have, it may mean that you should increase your prices.

Study your labor figures; have you been spending too much time on the work? Is there some way to make the various operations more efficient? If you look at this carefully, you may be surprised at how often you will find wasted time that you can eliminate.

Having looked at all costs and decided that by and large they're acceptable, then look at your sales. Are they sufficient for the amount of time you spent? If not, then you need to get more for your pieces. If your market won't stand a price increase, you have only two choices: find a way to whittle down your cost, or live

**Windfall Farm Furniture — Income Expenses 1st Quarter 1991**

| eneral xpenses | Wages | Telephone | Small Tools | Cost of Repairs | Vehicle Expenses | Utilities | Lumber | Furniture Supplies | Commissions | Postage | Legal & Professional |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | $38.79 | | | | | | | | | |
| | | | | | | $18.49 | | | | | |
| | | | | | | $53.81 | | | | | |
| | | | | $10.50 | | | | | | | |
| | | | | | | | | | | | |
| | $1000.00 | | | | | | | | | | |
| | | | | | | | | $17.38 | | | |
| | | | | | | | | | | | |
| | | | | | | $80.29 | | | | | |
| | | $24.05 | | | | | | | | | |
| | | | | | | $14.39 | | | | | |
| | | | | | | | | | | | |
| | | | | | | | $450.00 | | | | |
| | | | | | | | | $75.00 | | | |
| | | | | | | | | | | | |
| | | | | | | | | | $157.50 | | |
| | $1000.00 | | | | | | | | | | |
| | | | | | $125.00 | | | | | | |
| | | | | | | | | | | $20.00 | |
| | | $32.50 | | | | | | | | | |
| | | | | | | $17.78 | | | | | |
| | | | | | | $75.64 | | | | | |
| | | | | | | | | $25.68 | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | $100.00 |
| | $1000.00 | | | | | | | | | | |
| $0,00 | $3000.00 | $95.34 | $0.00 | $10.50 | $125.00 | $260.40 | $450.00 | $118.06 | $157.50 | $20.00 | $100.00 |

with the present level of profit.

After each succeeding quarter, post the totals from the Spreadsheet on the P & L and study them—not only for themselves, but compare them with the previous quarters. Look at the comparisons in the same way you did the single–quarter figures, and ask the same kinds of questions.

In a semi–production shop the system gets a little more complicated because you need more information. You are making a number of different items and making them in quantities, and it's important to know whether or not an item is making money. To find this out, you need to use a Job Cost Record and to break your costs into direct and indirect. The direct costs are those that can be allocated to a given lot of an item. The indirect costs are those that are so general they cannot be specifically identified with any particular item. Examples of these are the sandpaper and finishing materials you use, or the time you spend doing the office work. In setting up the Cost Spreadsheet, you need to have columns for direct and indirect wages and for direct and indirect materials. Most of the other column headings shown in Figure 1 will fall into the indirect cost category. In the Sales category you may want to keep a separate record of the sales of each item you produce. I'll explain the value of this record later.

Each lot of any item going through the shop should have a Job Cost Record, and the hours spent and the materials used should be posted daily until the lot is finished and ready for shipment. As to the design of this form, you know your own shop so I'll leave it to you. What works for one may not work for others. When the job is completed, the hours should be multiplied by the rate of the person who worked them and the figures totaled. The materials should be costed and totaled. At that point you will have the direct cost of that lot of that item.

We'll leave it there for the moment and talk about the Cost Spreadsheet. This record is kept just as discussed for the custom woodworking shop. The only difference will be the breakdown of wages and materials into direct and indirect. In the case of materials, this is not difficult. In the case of the wages, it is based on how the time is spent.

One of the best ways to keep track of this is to rely on time cards—even for yourself if you're working on the product. Time cards will also be useful in allocating time to the various Job Cost Records.

We now have to discuss a cost that was not considered in the previous example because differentiation was not necessary, and all costs were lumped together for the sake of simplicity. This cost is called overhead. It consists of all the costs that cannot be directly related to the items being made. This cost must be added to the direct costs on the Job Cost Record in order to calculate the true cost for the item. To do this, we resort to a formula: the total of all indirect cost for a given period divided by the number of direct labor hours for the same period. This gives an hourly rate for overhead.

As to the given period, it depends on when you make up your

**Figure 2. Sample Profit and Loss Statement**

**Windfall Farms Furniture – Profit/Loss 1991**

| **Sales** | **1st Quarter 1991** | **2nd Quarter 1991** | **3rd Quarter 1991** | **4th Quarter 1991** | **Year 1991** |
|---|---|---|---|---|---|
| Furniture | $4985.00 | $5724.00 | $3756.00 | $6050.00 | $20515.00 |
| Accessories | $75.00 | $275.00 | $435.00 | $345.00 | $1130.00 |
| **Total Sales** | $5060.00 | $5999.00 | $4191.00 | $6395.00 | $21645.00 |
| **Expenses** | | | | | |
| Admin. Expenses | $8.50 | $67.50 | | $85.43 | $186.43 |
| General Expenses | | $35.40 | $25.00 | $126.50 | $0.00 |
| Wages | $3000.00 | $3000.00 | $3000.00 | $3000.00 | $12000.00 |
| Telephone | $95.34 | $75.65 | $83.25 | $81.23 | $335.47 |
| Small Tools | | $85.90 | | $67.50 | $0.00 |
| Repairs | $10.50 | $25.60 | $136.68 | | $172.78 |
| Vehicle Expenses | $125.00 | $136.50 | $115.50 | $132.00 | $509.00 |
| Utilities | $260.40 | $255.80 | $251.75 | $335.00 | $1102.95 |
| Lumber | $450.00 | $485.00 | $300.00 | $575.00 | $1810.00 |
| Furniture Supplies | $118.06 | $35.00 | $45.60 | $63.75 | $262.41 |
| Commissions | $157.50 | $225.00 | | $183.50 | $566.00 |
| *Insurance | | | $375.00 | $250.00 | $0.00 |
| Postage | $20.00 | $20.00 | $20.00 | $20.00 | $80.00 |
| Legal & Professional | $100.00 | $25.00 | $75.00 | $100.00 | $300.00 |
| **Total Expenses** | $4345.30 | $4472.35 | $4427.78 | $5019.91 | $17325.04 |
| **Operating Profit** | $714.70 | 1526.65 | ($236.78) | $1375.09 | $4319.96 |

**Editor's Note: This category was left off the cost spreadsheet on the previous page due to space constraints.*

P & L Statement. If it is quarterly, then figure the rate quarterly. Going back to the Job Cost Records, take the overhead rate and multiply it by the number of hours you have recorded for that job to get the value of the overhead allocated to the job. Now, add the material cost, the wages, and the overhead figure together and you have the cost of the job. Divide that by the number of items in the lot, and you have the cost per item. Matching that against the price you're getting for the item will tell you where you stand on that item as of that moment.

At the end of the quarter, total the columns on the Cost Spreadsheet and transfer the totals to the P & L Statement; then make your analysis as I described for the custom woodworking shop. In this case you will expand your analysis to include the Job Cost Records. If the item is not profitable, why isn't it? Is the price too low or the cost too high? How does the labor cost look? Can you improve the efficiency of the operations or the handling in the shop? This is a particularly vulnerable point in a production operation. If the price appears to be too low, can you raise it? If not, maybe you should discontinue making the item. A further help in making this decision will be the record you have kept of the sales volume of each item. If you're not selling very many, there will be an added incentive to drop the item. The answers to these questions stem from the figures you have collected on the various records you are keeping.

As for the built–in cabinet shop, the cost records required are the same as for the semi–production shop, including the time card. However, you will need some kind of form to record the materials and labor used in the installation part of the job done out of the shop. It should be easy to use and should display the essential information in such a way as to make it easy to transfer to the Job Cost Record. This record is very important, and care should be taken to see that it is filled out and turned in. In the built–in cabinet shop this is the most vulnerable point in the operation. It is very easy for time and material to be lost during the installation process. It can cause you to lose money on an otherwise profitable job.

As with the other two examples, the time comes for analysis, and you do it in the same way, except that here you have the Installation Records to study as well.

Regardless of which kind of shop you run, you must be serious about your record–keeping, and when the time comes to do the analysis, take the time to be thorough. In my experience, the time to do it is in the evening when you can be free of interruptions and can concentrate on what you're studying. Alone in the office (wherever it is) where everything is handy for reference works best for me. Since you only do this once every three months, it shouldn't be a burden; but burden or not, it's worth the effort because it can mean the difference between success and failure.

Finally, let me say that I learned this system when I was assigned to the Air Force Cost Analysis Office during World War II. I have used it to great advantage ever since, whether working for myself or for someone else. If you apply it to your business you will find that it will be of great help to you also. PW

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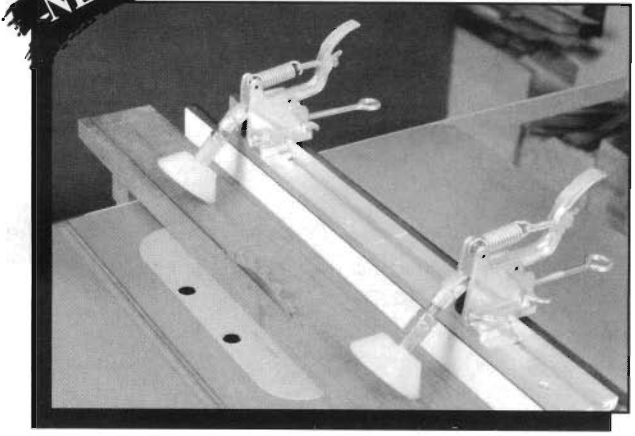

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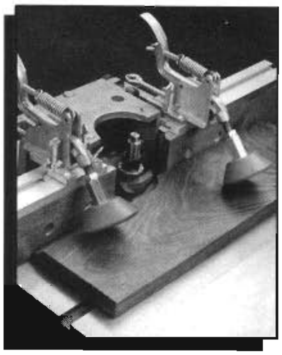

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# Book Reviews

by Hugh Foster

**Troubleshooting and Repairing Power Tools** by Homer L. Davidson (TAB Books, Blue Ridge Summit, PA 17294-0214) 243 pages, hardcover, $17.95

*Troubleshooting and Repairing Power Tools* is a far more sophisticated book than it initially appeared to be. The author is a long–time expert on electrical/electronic repair, and the author of 17 D-I-Y repair books for TAB. In this volume he teaches the careful reader the basics of preventive maintenance and routine repair of small, medium, and even stationary power tools. While the book never goes into the detail that the service manual for a particular tool might, it does teach us the basics of caring for, trouble–shooting, and repairing our tools.

This book will be of particular interest to the economy–minded who buy their tools at garage sales, as well as to almost anyone who buys better than throw–away tools. Most of us live too many miles from the nearest competent tool repair station, and we know that such repairs are expensive. Does it really pay to make a $50+ repair to a belt sander that cost little over $100 when it was new? Davidson will help you know how to decide. In addition to treating regular, plug–in electric tools, the author includes a chapter about taking care of battery–operated tools, which is sure to be increasingly useful as our first or second generation of battery–operated tools start losing their zip. Overall, I can't imagine a better treatment of this subject.

**Fine Craftsmanship in Wood** by Betty Norbury (Linden Publishing Inc., 3845 N. Blackstone, Fresno CA 93726) 192 pages, hardcover, $39.95

Anyone who looks at *Fine Craftsmanship in Wood* or any of *Fine Woodworking's Design Books* will know that craftsmanship is alive and well in the woodworking world. This volume is basically a British *Design Book*. As you study its pages, you'll find almost nothing that you'll want to copy directly, but you'll find lots of projects that suggest the "right" way to do things when laying out original projects.

The book is laid out somewhat differently from *Fine Woodworking's Design Books*; this one works alphabetically through a list of interesting woodworkers. The projects shown emphasize design and joinery. The work is nothing if not spectacular. In some respects, the volume appears to be a catalog in search of clients. The folk shown here do such elegant work that finding clients shouldn't really be a problem. Neither the book's Britishness nor its catalog–ishness should deter you from enjoying it. The hours you spend here will indeed be well rewarded.

**Identifying Wood: Accurate Results With Simple Tools** by R. Bruce Hoadley (The Taunton Press, 63 South Main St., Box 5506, Newtown, CT 06470-5506) 223 pages, hard cover, $39.95

This is a very technical scientific text that is likely to be of interest mainly to woodworkers who fell their own timbers or who have to match existing woods for repair work. Hoadley's theory is that one can identify 180 types of wood, most native to North America, by using a hand lens or simple microscope and the techniques described in this book. The main reason for the book's expense is likely the extensive use of color photomicrography which illustrates what the grains of the various species look like under magnification. While the audience for this volume is more limited than for other titles in this column, it is enthusiastically recommended to that fairly narrow audience. No other wood identification system comes even close.

**Queen Anne Furniture: History, Design and Construction** by Norman Vandal (The Taunton Press, 63 South Main St., Box 6606, Newtown, CT 06470-6506) 248 pages, hard cover, $34.96

If you have admired Queen Anne furniture but wondered, "How'd they do that?", Norman Vandal offers here the answers to just about all your questions on the subject. Far and away the most complete text on the topic I've seen, this volume gives measured drawings and construction techniques for eighteen classic pieces. Vandal shows us how to build using both *classic* hand–woodworking technique and state–of–the–art, modern electric tools. The color photos are beautiful; the black and white photos are both plentiful and helpful illustrations to the author's text. The graceful curved legs, shells, and scrolled pediments of my favorite "colonial" pieces are far less daunting than they were before I read this volume. Indeed, I believe that I learned enough from reading this book that I should be able to build "from scratch" a project that I recently saw advertised as a kit for something over $3,000. When my wife examined the book, she suggested that she'd be happy to buy me a thousand board feet of mahogany so that I could build her the projects in this book. It's a good thing it's hard–covered. The amount of use this one will get in the shop would wear out a paperback!

**Furniture: Modern and Postmodern Design and Technology** by John Pile (John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012) 312 pages, hardcover, $49.95

A couple of years ago, I enthusiastically reviewed John Pile's *Modern Furniture* in this column. This "Second Edition" bears virtually no resemblance to the first. There are more pages, bigger pages, and essentially entirely new contents. As Pile points out, in the decade since *Modern Furniture* first appeared, Modernism has been challenged; some designers have gone off in directions so different from those of traditional "Modernism" that they require a new name. Changes in office environments and available materials have forced some changes as well.

A sense of irony pervades Pile's text; one illustration shows a television cabinet with "historic" details thermoformed in plastic. In a more serious sense, Pile treats issues of function, structure and material, and the communication of meaning through form. There are new appendices which detail "Dimensional Standards for Typical Furniture Functions," "Problems of Design Protection and Design Credit," and "Safety Considerations." An expanded bibliography is sure to keep thoughtful furniture builders studying for months. PW

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***Hugh Foster*** *is a part–time furniture designer/builder in Manitowoc, Wisconsin, and the author of* The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*

# The Finishing Forum

by George Frank

**The Finishing Forum is an ongoing discussion about the art of wood finishing. If you have a question or a problem to solve, we'd like to help. If you have a tip or a secret formula to share or if you've recently tried a new finishing product, write to: The Finishing Forum c/o *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.**

## There's the Rub

I am looking for a good rubbing varnish. For the last thirty years I have used Benjamin Moore's Dri–Dull®, then Moorecraft® when they changed their label. They stopped producing this product last year. All the varnish that is on the market now contains vinyl, plastic and/or polyurethanes and they don't make for a good rubbed finish with pumice and rottenstone. Please help with a brand name and a supplier.

Edwin Greene, Duxbury, MA

*Seal the surfaces to be varnished with three coats of 2½ cut shellac (2½ lb. shellac flakes dissolved in 1 gallon denatured alcohol). Leave adequate drying time between coatings, sand the surfaces with finer and finer papers, and blow the dust away. On top of this, apply three coats of Behlen's Restoration Varnish following instructions on the container. This is a water–clear varnish that not only leaves the graining of the wood perfectly "readable" but it also gives to the surface a beautiful refraction. It can be rubbed to a very attractive luster and after 3-4 weeks of curing, the finish will well resist normal wear and tear, including spilled cocktails. This is the kind of varnish we have been dreaming about. It is available from Behlen, Rt. 30 North, Amsterdam, NY 12010, phone 518-843-1380.*

## Mom, the Cooky Jar Smells!

As you certainly know, mothers–in–law are the villains in most stories. Mine is the exception—she's charming, pleasant, friendly, impossible to dislike. Through the years she has helped us immensely. To show my appreciation, I made her a Christmas present which proved much to her liking. It was a cooky jar, made from a single piece of wood, the trunk of a walnut tree which I found in the attic where it had been drying for over fifteen years. I'm a professional accountant and a very amateur woodworker, but the cooky jar, after I rubbed on three coats of Danish oil, turned out to be a masterpiece, and my gift enriched the Christmas spirit in our home. Imagine how I felt a few days later when my mother–in–law, tears in her eyes, returned it saying, "The jar has an unpleasant smell inside, and so do my cookies." Can you help me get rid of this smell?

Bruce O'Keefe, Oklahoma City, OK

*Walnut wood dried for fifteen years has almost no detectable odor, and if it did it wouldn't be unpleasant. Hence the odor has to come from somewhere else. I am convinced it comes from your "Danish oil." I don't know any specific finishing product called Danish oil, but woodworkers in Denmark—and throughout the known universe—use oils for finishing wood. The best known and probably the earliest oil used for finishing is linseed oil, which when applied in thin layers absorbs oxygen from the air, and dries to form a light protective film. To speed up this polymerization, these finishing oils are combined with about 5% to 10% good varnish. My guess is that the Danish oil you used was manufactured in the basement of some unqualified faker, and that its main ingredient was raw, maybe stale linseed oil. You applied three coats which simply did not dry properly, and the oil became rancid.*

*Here's the remedy. First wash off all the present finish. It's an outdoor job, since your best bet is to use gasoline which is extremely flammable and requires great caution. With proper care you can dissolve the old, stinky finish and eliminate it with sawdust, steel wool, sandpaper, care and patience. When your masterpiece smiles at you in its original unfinished beauty, without any trace of its previous unpleasantness, you're ready to apply your own homemade Danish oil. Using a measuring container, mix three parts tung oil with one part good spar varnish (or polyurethane) and one part mineral spirit. Apply a generous coating on the wood. Five minutes later wipe off all excess with clean burlap. Then not only let this mixture dry for 48 hours, but hang a ten to fifteen watt light bulb inside the cooky jar for a good part of the time. Don't apply the second coat until the first is bone dry and odorless. Then rub down the coated areas with #0000 steel wool or very fine sandpaper and repeat the operation. But this time add the "George Frank touch"—when mother–in–law is not in the kitchen, borrow some vanilla extract and mix it into your homemade Danish oil, even if it does not mix readily. Your cooky jar will be the best looking and best smelling one in the State of Oklahoma. And kiss your mother–in law for me, but do tell her I would do it better (after all, I'm only going on 88).* PW

---

*George Frank is the author of* Wood Finishing with George Frank *(Sterling Publishing Company).*

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## Tried and True

**by Graham Blackburn**

# Moulding Planes

Moulding planes, once made by the hundreds of thousands, are now virtually forgotten by most toolmakers. Yet even the poorest example is likely to sell for several times its original cost, while quality ones may go for a thousand dollars each. What are these curious tools, why are they no longer made, and why do they still command often impressive prices? I'll try to answer these questions and show how most moulding planes are still a worthwhile investment for many shops.

Not everything that looks like a moulding plane is a moulding plane. Several other groups of tools not intended to make mouldings share the same features—they're wooden, narrow, about 9½" long, have an iron wedged in place, and a generally antique appearance. Some, such as rebate and dado planes, I've described in past Tried and True columns (*Popular Woodworking* #49, July 1989 and #52, January 1990). The mark of a genuine moulding plane is that its iron and sole form the profile of a shaped moulding—not just a simple step, rebate, or groove (Figure 1).

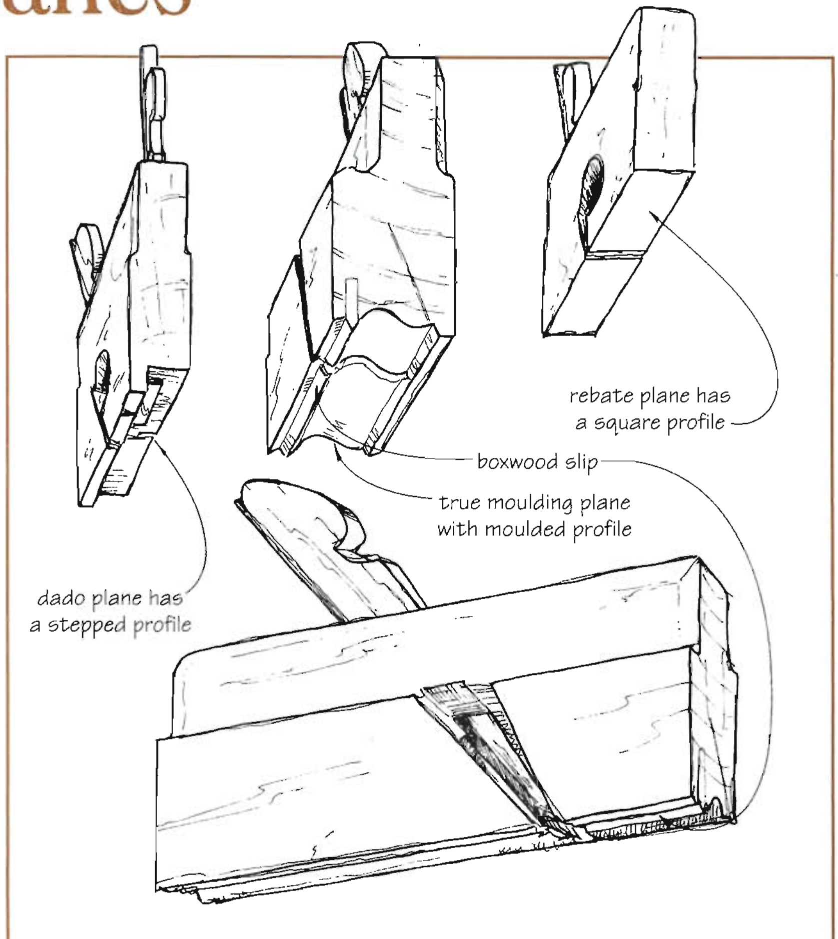
rebate plane has a square profile
boxwood slip
true moulding plane with moulded profile
dado plane has a stepped profile

**Figure 1. Distinguishing the Moulding Plane**

## What Is A Moulding?

In practice, the term "moulding" is reserved for a range of profiles usually formed on regular geometric principles and often grouped together in stylistic families. The term refers only to the actual profile, not necessarily to a particular piece of wood. Thus a moulding may be formed on the edge of an integral, often large piece of woodwork, as well as on a piece that is attached to other woodwork (Figure 2). The former is known as a stuck moulding, and a good example is the profile cut on the edge of a tabletop—where the moulding is often all one with the top itself. The latter is known as a planted or laid–in moulding, and is commonly installed around door frames, under overhangs, and around the tops of cabinets.

Although usually regarded as ornamental devices, mouldings originated as practical solutions to a range of problems. Strip a heavily moulded 17th or 18th century piece of woodwork of its moulding and you will undoubtedly end up with a poorly proportioned, plain piece. Thus mouldings can add to the overall shape and interest of a piece, or echo other design elements of the woodwork. They also have very practical purposes—a moulded edge is less likely to hurt you if you bang up against it than is a square and possibly sharp edge. An edge or corner is less likely to suffer damage itself if it's gently rounded. The inside edges of framing members in frame–and–panel construction are often moulded to prevent dust build–up. This practice, especially in traditional door construction, echoes the stonemason's habit of beveling the top edges of horizontal members to permit better rain run–off. Moulding the meeting edges of door stiles and panel parts is an effective way of masking any seasonal shrinkage which might produce unsightly gaps.

## Stylistic Congruity

Almost every occurrence of mouldings in traditional furniture reflects a structural need and not merely artistic whimsy or the desire to ornament. Nevertheless, when you use mouldings for purely practical purposes, you should be aware of the design principles that have produced such an enormous variety of profiles, many of which might answer your particular structural need, but not necessarily appear consistent with the style and design of the overall piece.

As a look at old tool catalogs will prove, there are hundreds of different moulding profiles. Observation of old buildings and furniture of all periods shows an even greater variety. How is it

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***Graham Blackburn** is a furniture designer and maker in Rio del Mar, California, and author of many books on woodworking and home maintenance including* A Home for All Seasons.

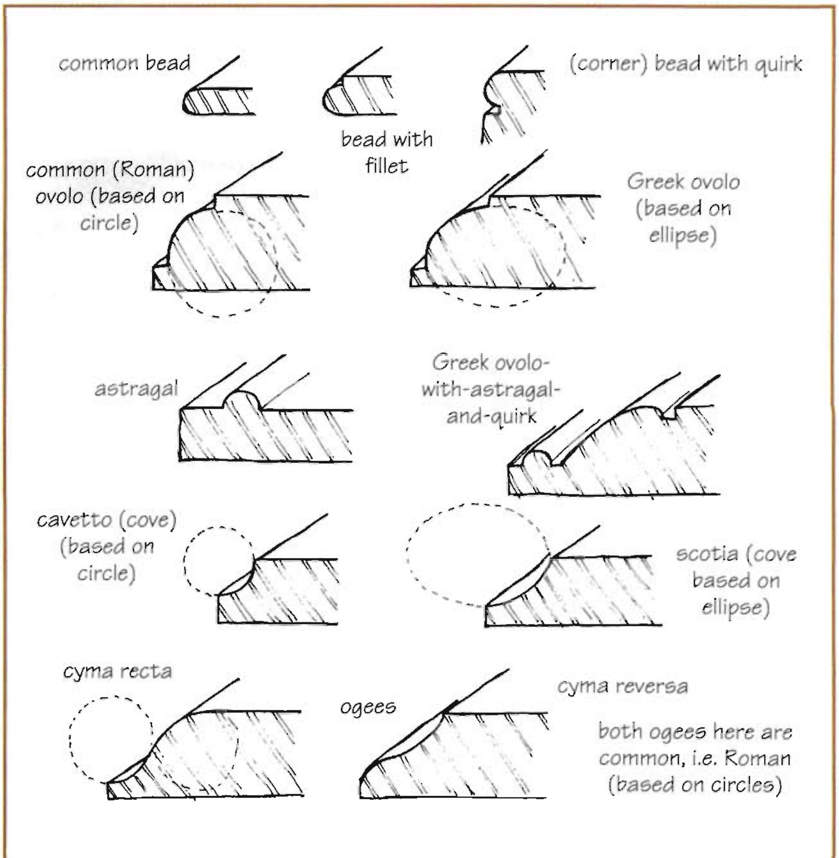

common bead
bead with fillet
(corner) bead with quirk
common (Roman) ovolo (based on circle)
Greek ovolo (based on ellipse)
astragal
Greek ovolo-with-astragal-and-quirk
cavetto (cove) (based on circle)
scotia (cove based on ellipse)
cyma recta
ogees
cyma reversa
both ogees here are common, i.e. Roman (based on circles)

Figure 3. Common Convex and Concave Mouldings

possible to know which mouldings are related? A few brief guidelines, along with the realization that woodworking moulding planes were made in families, points the way.

Mouldings are usually categorized as Gothic, Greek, Roman, or Contemporary. Further classifications derive from different periods in the history of furniture making. While a particular family of mouldings may have been used across the centuries, it's common to talk about mouldings from the "Age of Oak" and the "Age of Walnut" as if they were peculiar to those periods alone. What's *really* important is knowing which mouldings are related, and then using those mouldings that are consistent with a given piece of woodwork historically, stylistically, proportionately or simply geometrically. To use moulding profiles at random with no regard for purpose or historical and stylistic consistency is to court design confusion and incongruity. Learning to see the relationships is not hard. Once you've achieved basic familiarity, you'll be able to mix and match to advantage—there are no absolute rules, only the need for a bit of aesthetic common sense.

Roman profiles are constructed around circles and squares. Profiles referred to as Greek are based on ellipses and oblongs. The chief varieties of moulding planes are those employing convex and concave curves, ogees (S–shaped), and fillets and rebates (rectangular obtrusions or recesses) (Figure 3). Practically all moulding planes produce variations and combinations of these simple elements. During the 18th century, increased interest in the design principles of classical architecture resulted in close attention to the patterns and combinations of moulding profiles found on ancient columns, friezes, and pediments. Here is where originated the names by which many mouldings are known, especially those formed with 19th century moulding planes—*astragals*, *ovolos*, *cyma rectas* and *cyma reversas* (the last two being variations on the common ogee). All that's really necessary is to realize that a general principle of alternating and diminishing shapes is sufficient to achieve a pleasing and logical effect. Just take a look at the nearest neo–classical building or facade to see the patterns in which mouldings are used. Try to determine whether the profiles are segments of circles or ellipses. Unless the building is an ill–informed mish–mash of fake references to the past, you will rarely find both circular and elliptical patterns together.

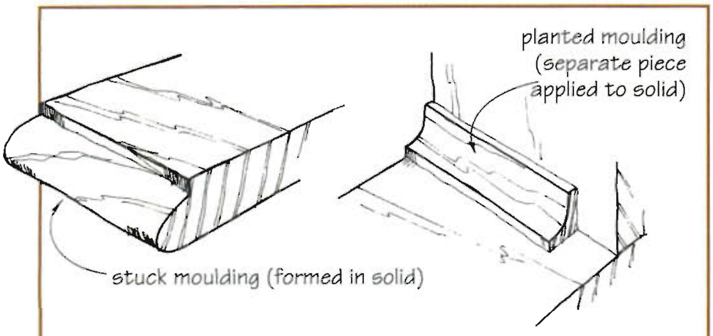

planted moulding (separate piece applied to solid)
stuck moulding (formed in solid)

Figure 2. Stuck and Planted Mouldings

author

## Building Your Tool Kit

Moulding planes are not rare and not expensive—except at specialized tool auctions. They cost little more than an average router or shaper bit (far less than carbide–tipped tools), don't need power, make little noise, and are easily maintained. Router bits can't necessarily be sharpened indefinitely without rendering them useless by virtue of changing their diameter; a properly cared–for moulding plane can see serviceable use for many generations. Little setting up is needed, and if used properly, no finishing is required to remove tool marks—a well–sharpened iron leaves the wood perfectly smooth.

Like router bits they come in sets of graduated sizes, but even a single plane may be adequate. Which one depends on what you find first. A complicated reverse–Grecian–ogee–with–cove–and–astragal will produce a handsome moulding perfect for the top of a baseboard or a cabinet bonnet, but a simple cove plane can be equally useful for finishing edges of tops and shelves. Several planes may be used in combination on the same piece of wood, building a more complicated profile than any single tool might be able to produce. Just take care not to mix disparate types such as a Roman cove with a Grecian cove. For traditional work, take traditional pieces as models, but don't be afraid to experiment. *One of the* delights of using mouldings is to create lines of shadow and highlight. Aim always for a sense of proportion, which you can often achieve by alternating shapes and by sizing elements progressively.

## Making the Tool Work

If you're a first–time user you're likely to give up in frustration quickly unless you're aware of two important facts. A moulding plane is used from the far end of the work first, in distinction to a bench plane which is used starting at the near end (Figure 4). By starting at the far end, a section of profiled wood is always available to guide the plane. Second, you must usually keep the tool pressed sideways to the work. Most moulding planes are made with a built–in shoulder for this purpose. Unless the tool is operated consistently in the same longitudinal plane, the width of the profile will vary and soon become unrecognizable. Most are intended to be used in an off–the–bench way: when standing in front of the bench use the plane from right to left and cut that edge or side of the work that faces the front of the bench. A few cut on–the–bench, and even fewer have no built-in shoulder and are intended for use either with guides fixed to the work or freehand.

Among the latter group are the many moulding planes known as hollows and rounds (Figure 5). These cut no pre–determined moulding on their own, but are used in combination with other moulding planes to produce a profile for which no specific plane exists.

A moulding plane's built–in fence will usually make obvious the vertical angle at which it is to be held to the work. But be aware that most planes made during the 19th century (the bulk of the planes you're liable to find at flea markets, antique stores and old tool shops) were made with "spring." This term indicates that you use the tool at a slight angle from the vertical. Exactly how much is indicated by the "spring line" inscribed on the toe of the stock. The purpose of spring is to ensure a consistent and optimum mouth opening for an iron that is formed with compound curves. To use the tool efficiently, hold the plane so the spring line is vertical (Figure 6).

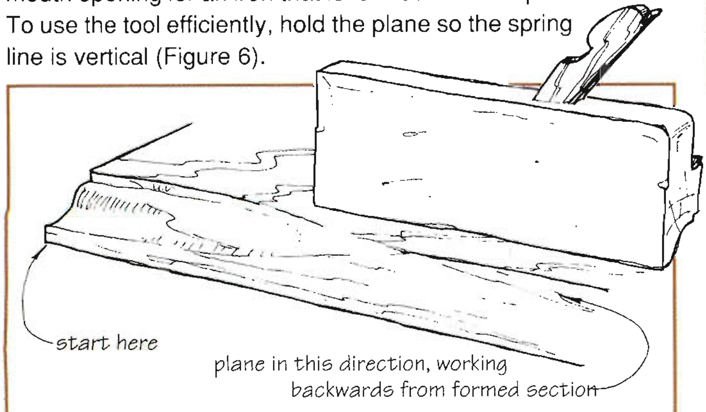

start here
plane in this direction, working backwards from formed section

Figure 4. Moulding Plane Use

## Sharpening and Setting

The back of the iron should be perfectly flat. Use a diamond stone if necessary, but be careful to keep the flatness in one plane, all the way up the back of the iron. If the end of the iron is flattened out of plane with the rest of the blade, it will not be supported adequately by the wedge and the tool will chatter. Similarly, the other side must be flat enough to rest securely on the bed of the plane's throat.

Beginners often recoil from any attempt to sharpen a profiled cutting edge for fear of altering it. While it is true that unless the cutting edge matches the sole's profile you'll be in trouble, it's not hard to do if you know a simple trick. Assuming the cutting edge still bears some resemblance to the sole's profile, use a short section of planed moulding—planed with the blunt tool if need be—as a sharpening stone. Coat it with slurry from a waterstone or powdered grinding paste. The moulding section ensures that the iron's cutting edge matches it. In extreme cases, set the iron so plenty of it protrudes through the sole. Then trace the profile of the sole on the back of the iron. Careful grinding on a stone or with a rotary tool fitted with a small abrasive wheel will reform the correct profile.

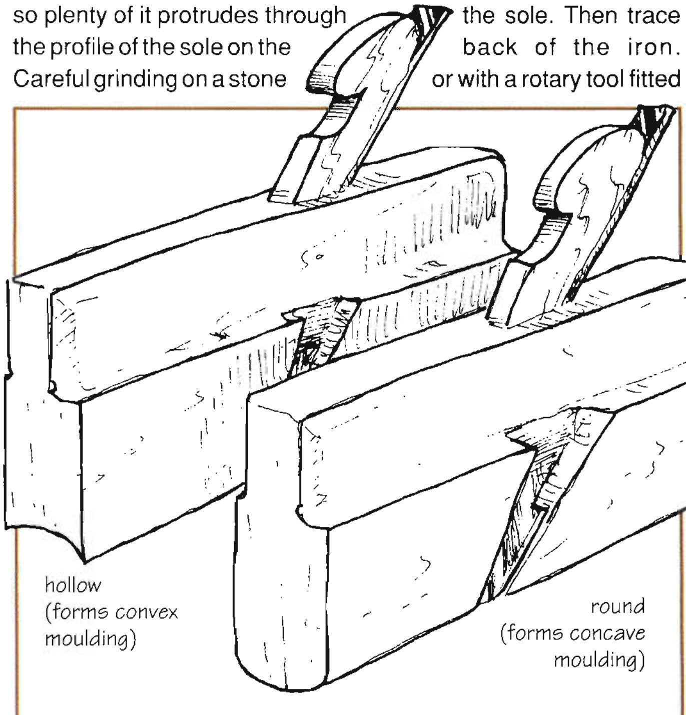
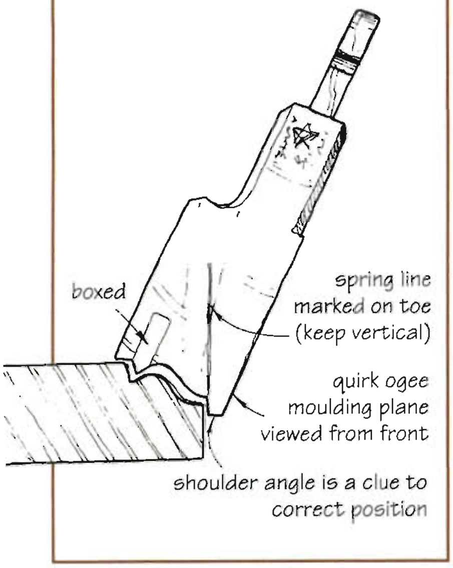

hollow (forms convex moulding)
round (forms concave moulding)

Figure 5. Hollow & Round

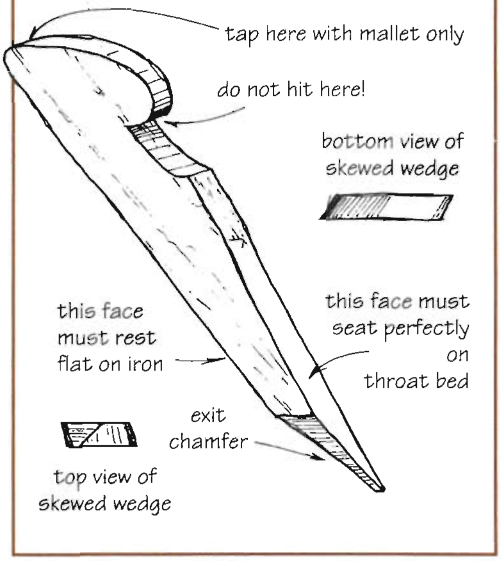
Although the cutting angle or pitch of the iron may vary depending on whether it was sharpened for use on hard or soft woods, the bevel should be around 25° to 30°. If it blunts too quickly, steepen it. For a sharper edge, make it shallower. Moulding planes intended originally for carpentry were usually made with a regular 45° pitch. Higher pitches, 50° to 60° (known as half and York pitch), were intended to make working with hardwood easier.

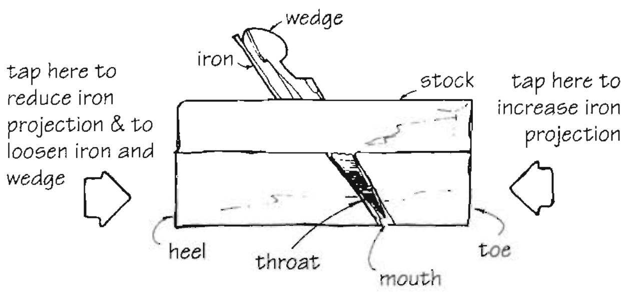
The wedge itself is frequently given short shrift. When new, the end inserted into the plane is finished in a particular shape, designed to deflect the shavings that enter the throat so they exit

### Figure 6. Spring Line


boxed
spring line marked on toe (keep vertical)
quirk ogee moulding plane viewed from front
shoulder angle is a clue to correct position

### Figure 7. Wedge


tap here with mallet only
do not hit here!
bottom view of skewed wedge
this face must rest flat on iron
this face must seat perfectly on throat bed
exit chamfer
top view of skewed wedge


wedge
iron
stock
tap here to reduce iron projection & to loosen iron and wedge
tap here to increase iron projection
heel
throat
mouth
toe

### Figure 8. Iron Adjustment

sideways (Figure 7). If this end is chipped or broken, the shavings may clog. Put the wedge in the vise and carefully plane the side that rests on the iron so that it's perfectly straight, square and true. Or you can hold the wedge in one hand and move it over an upturned bench plane's sole, simply taking care to hold it perfectly perpendicular—unless it's the wedge to a moulding plane with a skewed blade! In this case observe the angle apparent on the top of the plane (where the wedge is inserted), and duplicate it. This may sound difficult, but you're dealing with a very small piece of wood and the adjustments are not hard to make.

Never hit the end of the wedge that protrudes from the plane with anything but a mallet. Do not drive it out by hammering upwards on it! The proper way to remove the wedge is to rap smartly on the heel of the stock with a mallet while holding the stock in one hand. Rapping on the heel lightly will cause the iron to retract into the body of the plane; continued or stronger taps will cause the iron and the wedge to loosen enough to be removed by hand. Similarly, once you have the wedge fairly securely in place (perhaps helping it in with a gentle mallet tap), you can further adjust it—causing the iron to protrude more from the sole—by rapping on the toe of the stock (Figure 8).

Many planes will bear the (shameful) marks of having been hit with a hammer rather than a mallet. Hammering is especially damaging with planes that are boxed since it can damage or loosen the slips. Boxed means that sections of hard–wearing boxwood—known as slips (Figure 1)—have been inserted in the sole to retard deformation of its profile.

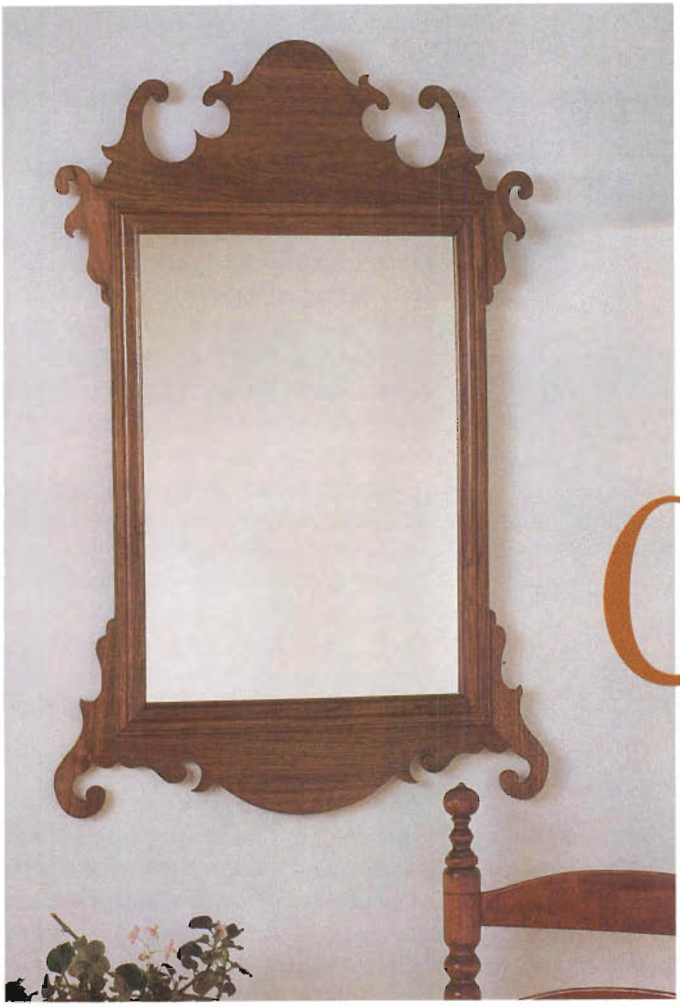
Another reason for being careful with wedges is that they're one of the prime ways of determining who made the plane. Planemakers may often be identified by the exact profile of the top end of the wedge. This is of great interest to tool collectors and often determines how much a tool is worth, though it has little to do with how well it may work.

### Structural Fitness

So far we've assumed that the tool is worth using—and, in fact, 90% of all moulding planes as found will be—but there are a few things that can render a tool useless. The first is warpage. Sight along the bottom of the sole, not to establish flatness—this can be corrected—but to see if the plane is bent sideways. This sometimes happens to thin–bodied tools and makes it next to impossible to form mouldings on straight stock. Next, check the tightness of any boxing. Boxwood slips are most common in beading planes; if they're loose or missing the plane will still cut, but it'll be harder to keep on track.

Wormholes, soft rot, even chipped or missing sections are not necessarily grounds for rejection if they're not too extensive, but pay attention to arrises and shoulders. If the plane has been badly abused, these may be so worn that the tool will have insufficient bearing surfaces to keep it aligned in use. This is especially true of any integral shoulder. You may expect some wear of a shoulder at the toe end of the plane—this is the part that receives the brunt of the wear—but if it's worn into a series of step–like projections, you'll have a hard time keeping the tool on track.

Lastly, and possibly most important, is the mouth—the size of the opening immediately in front of the cutting edge. Together with the depth at which the iron projects, this determines the thickness and character of the shaving it takes, and how well the plane will work. The harder and knottier the wood, the slighter the projection you want. Similarly, the smallest mouth will work best on wavy or rowed grain. If the mouth is too large you can try reducing the projection, but it may be necessary to remouth the plane by gluing a small piece in the throat *in front of the iron*. Cut this to match the profile. Maintenance consists of little more than oiling the plane with linseed oil if it's dry or gray, and occasionally waxing the sole. Do this and you should be able to produce moulding that needs no further work; the wooden sole will leave the surface of the moulding burnished and ready to finish.



# Chippendale Mirror

### by John A. Nelson

When my two oldest daughters, Julie and Joy, each wanted a hanging wall mirror, I went shopping and found that full–size wood–framed mirrors sell for between $225 and $350 at furniture stores. So after a little research I came up with this copy of an early Chippendale mirror. The Cutting List gives dimensions for both a small version, requiring a 9⅝" X 14⅛" mirror, and a larger one fitting a 14⅞" X 21⅞" mirror. I suggest you make the frame from a quality hardwood—mahogany, cherry, walnut or curly maple.

The moulding profile (see the Figure) on the sides (A), top and bottom (B) can be cut using a combination of router or shaper bits, or you can design your own moulding profile using bits at hand.

After milling the moulding stock, cut a ⅜" X ½" rabbet for the glass as shown in the Section details. This rabbet is the same size whether you're building the larger or smaller version.

Before mitering the pieces to their finished lengths, cut out the scroll pieces. Transfer the the full–size scrollwork patterns from the PullOut™ Plans to the wood. Then cut out the top and bottom scrolls. Tape together the two pieces of wood for the top side scrolls (F) and the two for the bottom side scrolls (G). Transfer the pattern for each to the top pieces of the pairs and cut them out.

Cut the moulding stock to length for the top and bottom frame members (B). Their finished length is crucial for the scroll pieces to fit properly, so miter them to fit between points X and Y indicated on the patterns in the PullOut™ Plans.

For a simple mitering jig, see the laminated picture frame project on page 30. A more sophisticated mitering jig is discussed in "An Advanced Miter Jig" (page 32).

Cut ⅛" wide X ¼" deep grooves in the mitered ends for the splines as shown in the Figure, and cut the splines (C). Be sure the grain runs across their width. Glue the frame together, making sure all corners are exactly 90°.

When dry, use a ¼" straight bit in a router table to cut the groove along the top and bottom edges to receive the scroll pieces. The grooves must run along the entire top and bottom edges, and extend 4⅜" (2¾" for the small mirror) down from the top piece and up 4⅝" (3") from the bottom piece part-way into the sides.

Glue the scrolls (D, E, F and G) to the frame, and check for a good tight fit at the corners. When dry, glue in the center brace (H) and the four blocks (I). Re–sand all over with very fine grit paper. Check to see that the backboard (J) fits exactly.

Finish the mirror frame before attaching the backboard and mirror. You can stain it, or, if you've used a quality wood like walnut, mahogany or cherry, apply four or five coats of tung oil or Watco®. Sand lightly between coats with #0000 steel wool. Add a coat of paste wax and it's ready for the mirror. Add picture frame eyehooks and wire, clean and polish the mirror, and your Chippendale mirror is ready to hang—perfect for any room. PW

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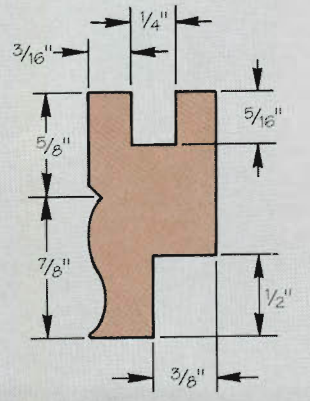
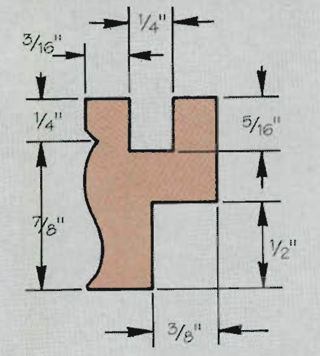
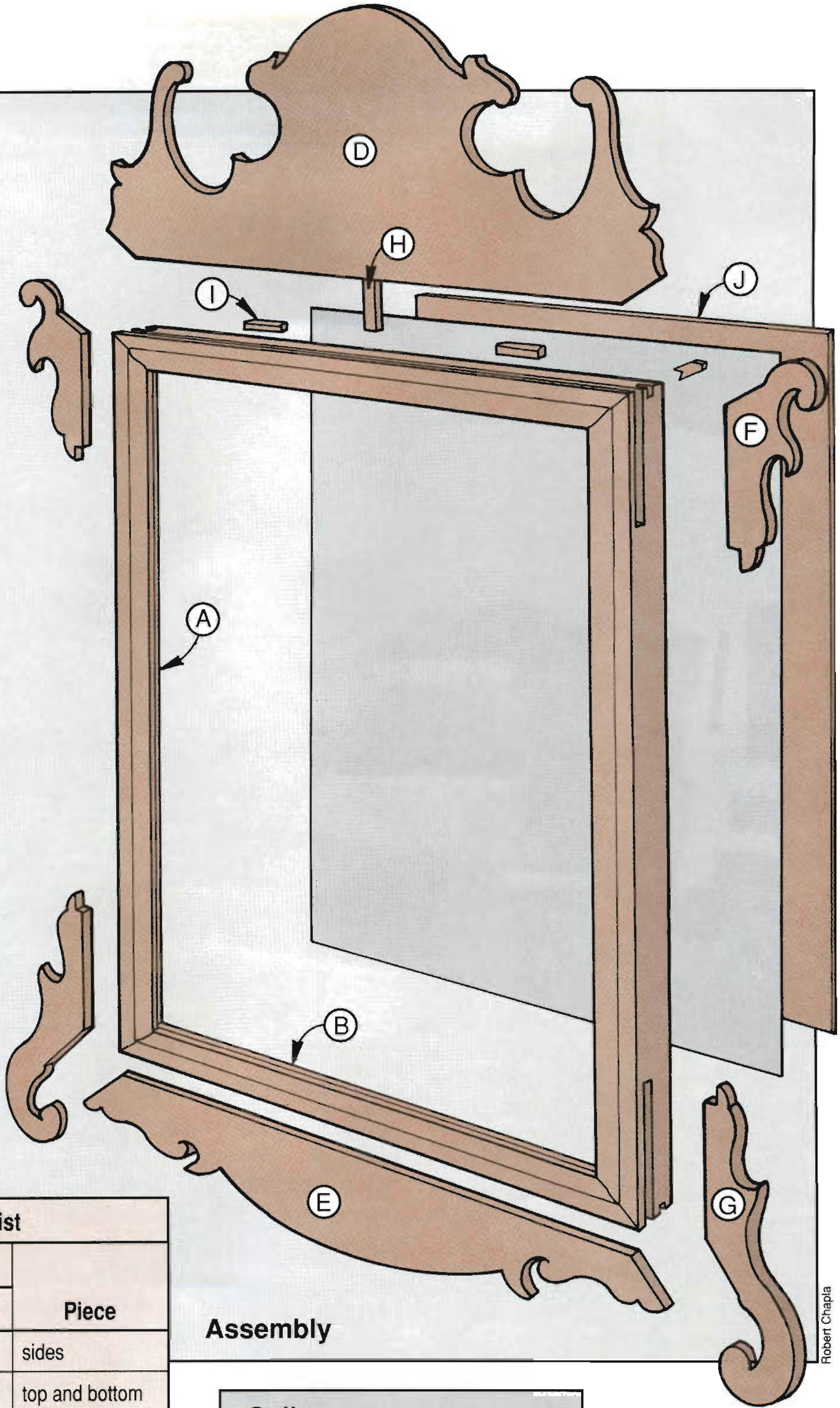
***John A. Nelson** is a woodworker and drafting instructor from Peterborough, New Hampshire, and the author of* Colonial Classics You Can Build Today *(Stackpole Books, Cameron and Keller Streets, P.O. Box 1831, Harrisburg, PA 17109).*



**Large Frame Section**



**Small Frame Section**

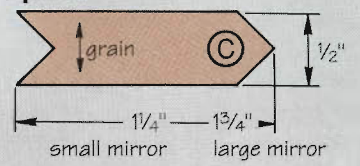


**Assembly**

Robert Chapla

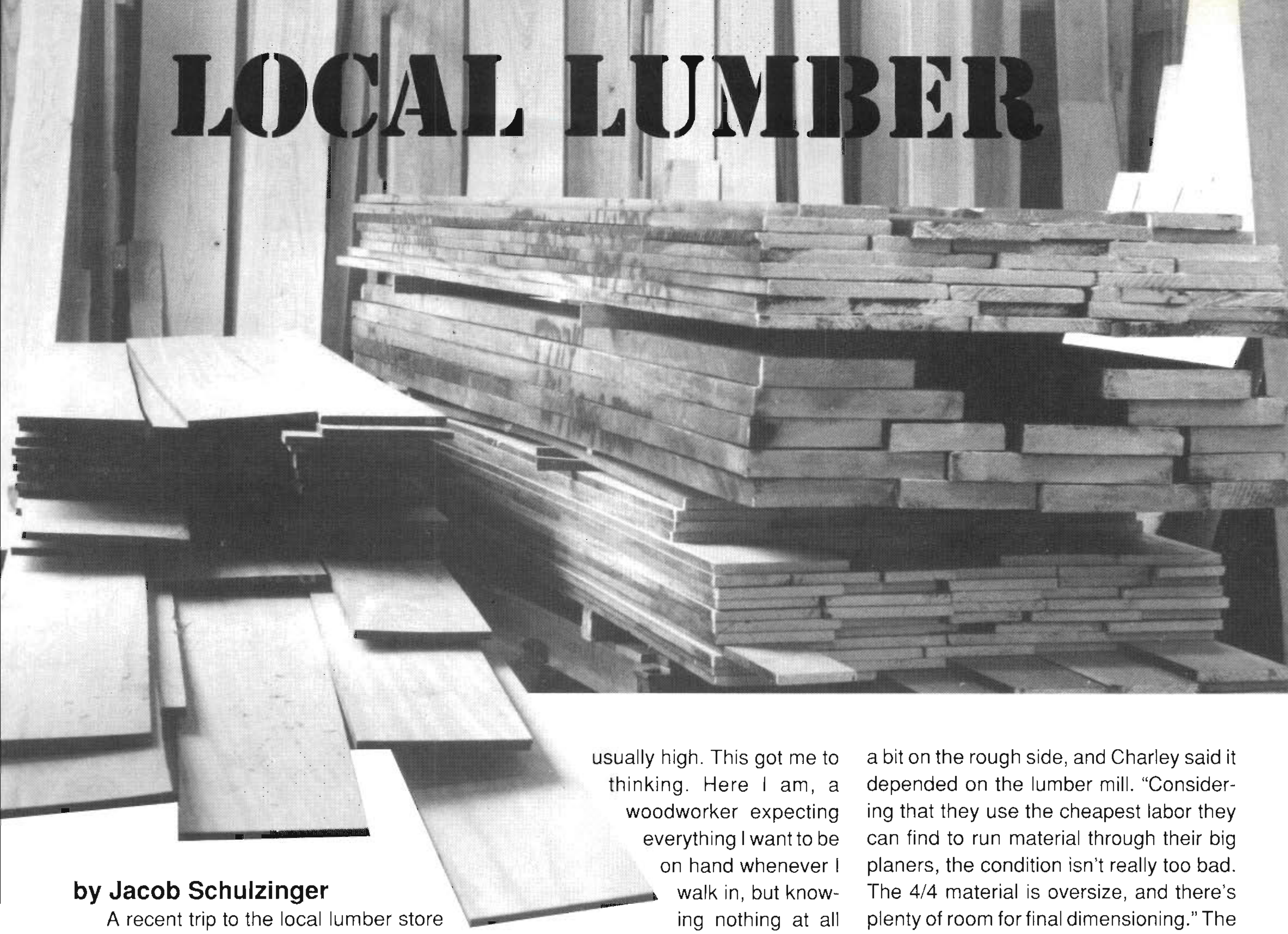
| Chippendale Mirror Cutting List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Small Mirror | | | Large Mirror | | | |
| Qty | Part | T | W | L | T | W | L | Piece |
| 2 | A | ¾" | 1⅛" | 15½" | ¾" | 1½" | 24" | sides |
| 2 | B | ¾" | 1⅛" | 11" | ¾" | 1½" | 17" | top and bottom |
| 4 | C | ⅛" | ½" | 1¼" | ⅛" | ½" | 1¾" | splines |
| 1 | D | ¼" | 5" | 12" | ¼" | 7⅝"" | 18½" | top scroll |
| 1 | E | ¼" | 2¾" | 12⅜" | ¼" | 4¼" | 19¼" | bottom scroll |
| 2 | F | ¼" | 1¾" | 4⅛" | ¼" | 2¾" | 6 5/16" | top side scrolls |
| 2 | G | ¼" | 2 3/16" | 5¾" | ¼" | 3¼" | 9" | bottom side scrolls |
| 1 | H | ¼" | ½" | 4½" | ¼" | ⅝" | 7" | center brace |
| 4 | I | ¼" | ½" | 1½" | ¼" | ½" | 1½" | blocks |
| 1 | J | ¼" | 9⅝" | 14⅛" | ¼" | 14⅞" | 21⅞" | backboard |

**Spline**



| Supplies | |
|---|---|
| small mirror 3/32" X 9⅝" X 14⅛" | large mirror 3/32" X 14⅞" X 21⅞" |
| ¾" square cut finish nails | |

# LOCAL LUMBER



### by Jacob Schulzinger

A recent trip to the local lumber store really opened my eyes. Usually I know exactly what I want, dash in, select the material and leave. This trip, however, turned out different. They were out of cherry and I'd have to substitute if I expected to start my latest project on schedule. Charles Burford, owner of Fine Woods of Houston, steered me to a couple of stacks he thought I might like.

"The red oak is worth considering, and the Honduras mahogany is some of the best I've seen for awhile," he said. I dutifully started my search, thinking this was just another sales pitch. But Charley was right. The red oak was beautiful and the mahogany was exactly what I should have been looking for. While I was looking, a few other customers came in for cherry, too. They got the same answer; recent tropical storms had delayed shipments of cabinet-grade lumber. He explained that oak and mahogany are normally top sellers, and that the demand for cherry had been unusually high. This got me to thinking. Here I am, a woodworker expecting everything I want to be on hand whenever I walk in, but knowing nothing at all about how a hardwood lumber company operates.

## One Man's Business

Charley Burford bought Fine Woods of Houston in 1980 after having been a cabinetmaker. "The company has been in business since 1974. I guess I was in the right place at the right time when it was put up for sale," said Charley. He has a new 5,000 square foot shop that is well lit, well insulated, and can handle anything that comes his way.

Burford generally stocks about 25 species of domestic and imported woods. While some hardwood and all sheet goods come from Texas or Louisiana, his best domestic lumber is trucked in from the Northeast. The hardwood comes surfaced on two sides (S2S) with the exception of 3" and thicker stock, which is delivered in the rough. Charley makes good use of his 12" SCMI jointer and 18" Rockwell planer. He also has a 12" radial arm saw for cross cutting and a 14" table saw for ripping.

I found some of the "surfaced" material a bit on the rough side, and Charley said it depended on the lumber mill. "Considering that they use the cheapest labor they can find to run material through their big planers, the condition isn't really too bad. The 4/4 material is oversize, and there's plenty of room for final dimensioning." The surface of the boards I bought was pretty good and, with a bit of hand planing, I brought the material down to size.

About 50% of Charley's time is spent in milling for his customers. This is where Charley's skill in material handling pays off. He runs boards through the jointer to straighten one edge, rips them to rough width on the table saw, and runs them through the planer for thickness and finish. Then it's back to the jointer for final squaring. While most of us have gone through this sequence of events for our projects and thought nothing of it, here it's on a much larger scale. Imagine handling 12' long, 40-pound boards all day. The trick is leverage—pivot the boards or pick them up at the center of balance.

The only easy part of unloading over 1,000 board feet from a truck is using a forklift. "Until I got that machine it was just plain hard work." The boards are placed on a wheeled cart and pushed to the racks. They're sorted by thickness and width and stacked. To get an idea of the amount of labor involved, imagine 1,000 board feet of

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***Jacob Schulzinger** is an industrial engineer in the aerospace industry. Woodworking is his part-time business and hobby.*

oak, weighing about 1½ tons, every piece being handled at least twice.

## More Than Cutting Boards

Who are Charley's customers? "I cater to amateur woodworkers, small cabinet shops, flooring companies and local artists—I regularly make bases for sculptures." This changed my concept of what a furniture-grade lumber supplier does, and it's this portion of the business that Charley finds most interesting.

"Flooring companies generally ask me to make up landings and special trim pieces for staircases, while the small cabinet shops will give me some of the smaller jobs that would be too expensive for their customers if they were to handle it themselves. I also have lots of customers who aren't even woodworkers. They're just folks who want to repair something or are looking for someone to do a small job. One fellow wanted to make a dining room trestle table. After I answered his questions on material, design and joinery he decided the job was more than he could handle. I ended up building it."

Charley builds about six major pieces a year as a result of customer inquiry. Other commissions include consoles and dashboards for cars, and hatch covers, companionway boards, railings and rod holders for boats. He's even built teak bumpers for deep sea robots.

Amateur woodworkers represent a significant part of his business, and Charley has developed a good rapport with his customers. Their skill level ranges from beginner to advanced, and his experience as a cabinetmaker comes in handy. He helps select material, and sometimes checks their designs, and advises them on sharpening and tool use. He's undoubtedly the only woodworking instructor many of his customers have had.

When I asked where the average customer needed the most education, his answer was "buying the right amount of lumber. It's not the number of board feet or the number of 8' 1 X 6 planks that should be on the shopping list—it goes deeper than that. Bring in a complete cutting list, including quantities and finished sizes of each piece along with any requirements on figure or grain direction—especially for plywood." When selecting, measure each board and make allowance for material loss at the ends. Check off each piece as you identify its position on the raw stock. Even with this careful process, you should expect to lose 3" or 4" from each end because of defects.

"If you don't want to make an extra trip to your supplier later, I recommend buying some insurance." This is nothing more than extra stock, enough to re-make the largest single piece on the cutting list. "Each species will respond differently to machining and you may need some safety stock—extra material to allow for damage from machining." For example, expect more chipping when you rout oak than when you rout mahogany.

## Advice From A Lumberman

"Don't come in with a closed mind; you may not find exactly what you want. Look around—you may discover that a different species has more character to it."

One common mistake is believing that *everything* must be built from solid wood. Some jobs are better suited to plywood. "It's not an inferior material. The notion that it's not suitable for furniture is the result of products improperly designed or finished." Charley feels the biggest problem in plywood furniture is edge finishing. "I recommend that edges be capped or face-framed with solid wood. The veneered edges that you sometimes find are the parts that usually fail first. The capping acts like armor to protect the more delicate veneers from damage." When should you use plywood? "It's ideally suited for deep shelves and large areas where you want flat, straight surfaces."

Lumber and custom milling is a competitive business, and you succeed by filling as many of your customers' needs as possible. Burford sells a variety of items to round out his stock—dowels, plugs, finishing materials, and hand and small power tools.

He also carries Baltic birch plywood. "I try to handle only material produced in Finland, but it's tough to get sometimes." Scroll saw enthusiasts love it because the edges finish so nicely. It's a favorite with cabinetmakers who use the ½" thick stock for drawer slides.

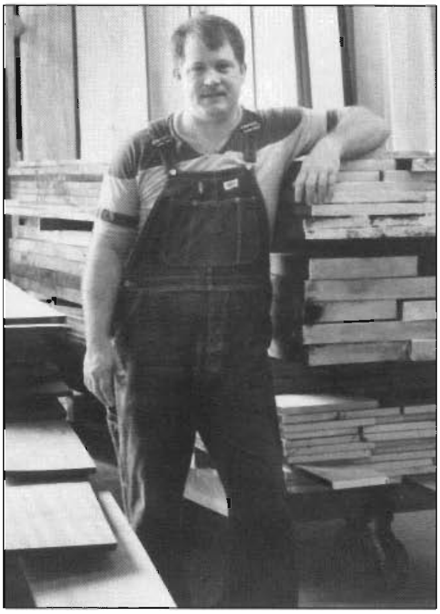
What's the best part of the job? "I work to my own schedule. I determine the quality of what I produce so it's always the finest. I'm extra critical about work I do for others."

Does he miss cabinetmaking? "I work with more wood now than I ever thought was possible. I guess you might say that I'm more a connoisseur of wood than ever before. When I get a shipment of lumber, I can almost tell by looking at it just how it will finish out. Cutting the lumber gives me the full impact of the aroma and the feel of just how it will respond when it's on someone's bench. I really get to know each board I process and I've learned to appreciate a really fine shipment."

Charley runs a "service-oriented business," and service is the one commodity that big companies really can't provide. He provides the best material and does the best work he can because that's what makes customers return. And it's this attitude that has made him many friends in town.

Charley Burford is a prime example of what woodworking is all about. It's easy to see why he's still in business. PW

photos by the author



# Building a Simple Biscuit–Joined Table

**by Hugh Foster**

Though it's as good-looking as anything on the market, this graceful kitchen table will go together nicely—perhaps including finishing—in a single weekend. This is the sort of project that makes it very easy to justify owning a biscuit joiner because it's the tool that makes the work go fast.

Since the project can be built from about 17 board feet of primary material, the cost difference between luxury-grade materials and inexpensive stock is not terribly great. My total cost for the cherry table pictured can't have been over $50—and there's no material I'd rather work than cherry.

Any of the dimensions in the Cutting List may be altered for different needs. Once you've chosen your stock, joint and plane it to dimension. You are more likely to get full 2" X 2" legs (A) from 2" stock if you cut it slightly oversize while the lumber is still rough; then plane minimally on the individual pieces. This is far more attractive than glued-up legs from two or more pieces of 1" stock.

Sort the pieces for the top (B), then joint the edges until they are flat and square enough to be glued. Next make a light pass with a block plane removing a little material from the center of the edges but not at the ends. I do this to "spring" the joints so they'll be less likely to break as the wood dries with the passage of time. Arrange them for the most attractive panel, and mark the arrangement.

Biscuit joining is one of the easiest ways to align the stock for edge–to–edge gluing. Cut slots for biscuits 2" to 3" from the

| Biscuit–Joined Table | | | | | |
|---|---|---|---|---|---|
| **Cutting List** | | | | | |
| | | **Finished Size** | | | |
| **Qty** | **Part** | **T** | **W** | **L** | **Piece** |
| 4 | A | 2" | 2" | $29^{1}/_{4}$" | legs |
| 1 | B | $^{7}/_{8}$" | 32" | 36" | top |
| 2 | C | $^{7}/_{8}$" | 3" | 24" | short apron |
| 2 | D | $^{7}/_{8}$" | 3" | 28" | long apron |
| 2 | E | $^{7}/_{8}$" | 2" | $20^{1}/_{4}$" | short braces |
| 2 | F | $^{7}/_{8}$" | 3" | $29^{1}/_{2}$" | long braces |

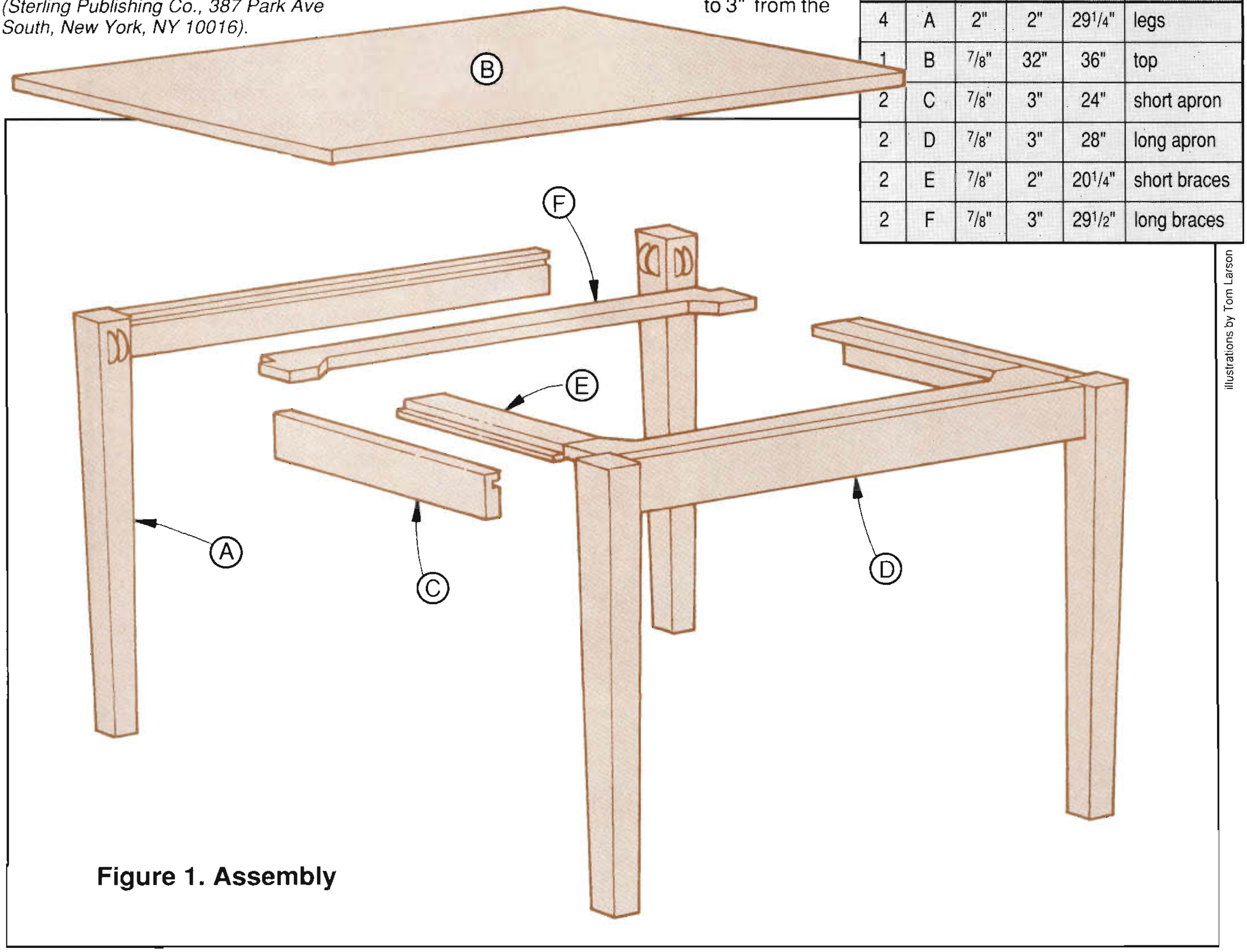


**Figure 1. Assembly**

illustrations by Tom Larson

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***Hugh Foster** is the author of* The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Ave South, New York, NY 10016).*

ends, and at 6" to 8" intervals. Glue up the panel and set it aside to dry.

There are several ways to fasten the top of a table to the aprons (C and D)—all of them require that a groove be milled on the apron before assembly. You might opt to cut a ⅛" groove, ¼" from the top edge to accept table irons, or you could cut a ⅜" groove ⅜" from the top edge to accept rabbeted braces (E and F), as I've chosen to do (see Figure 1). Still another option would be to cut biscuit slots, and join the braces to the apron that way.

The next step is to cut biscuit slots for joining the aprons to the legs. I like to have the aprons set back from the legs, and I use ½" and ¼" spacer blocks to locate the slots to accomplish this. Set the fence on the joiner so that it's 15⁄16" away from the bottom of the blade as shown in Figure 2. Arrange the legs the way they'll be when assembled, and mark the faces that will get biscuit slots. Make the reference mark that lines up the center of the biscuit joiner 1½" from the tops of the legs. With the stock clamped to the workbench, cut the first slots on the eight surfaces of the legs. Repeat the operation on the same surfaces with a ¼" spacer block set under the joiner fence (see Figure 2b). Now mark the aprons with the reference mark 1½" from their top edges. Without changing the biscuit joiner setting, mill the first slot in the aprons with the ¼" spacer block in place (Figure 2c); then mill the second slot with the ½" spacer block (Figure 2d). Be sure the material is clamped securely before making each cut.

Final shaping of the top, legs, and aprons should precede final assembly. I went around the top with a ¼" round-over bit on both the upper and lower surfaces. You may have a different decoration in mind. I used the same bit on both the inside and outside surfaces of the apron bottoms and on all four corners of each leg. It was easier, quicker and safer to push the wood through a setup on my router table than it would have been to bring the router to the wood.

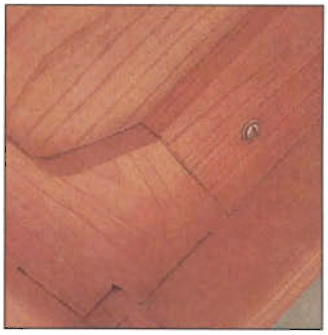
Begin assembly by gluing two legs to one of the short aprons. Then make a second subassembly with the remaining legs and short apron. When these are dry, clamp the two long aprons between the assemblies and check for square.

photos by the author

Set the top upside-down on some padded sawhorses and position the leg assembly. Measure all around until it's centered; then fasten the top with your table irons or with screws driven through slotted holes in the brace pieces.

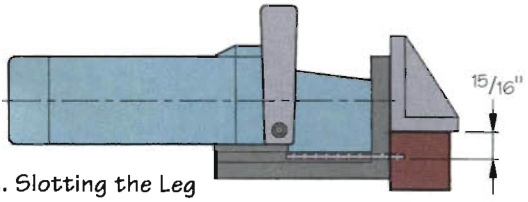
Flip the assembly over, fine sand the unit, wipe off all the fine dust, and apply your choice of finish. Lately I've been taken with Hydrocote® satin polyurethane, which provides an excellent finish in about three or four coats—all of which can be applied in the same afternoon. Indeed this finish, which is best applied with a rag (and rubber gloves) or an inexpensive foam brush, is part of the secret of making this table a one-weekend project. After the fourth coat of polyurethane has dried, apply a coat of wax with a piece of synthetic steel wool, and buff the wax to a fine sheen.

This project uses enough biscuit joinery to serve as a worthy introduction to most aspects of the technique, while providing you with a handsome project for your efforts and a design good enough to modify for other uses. PW

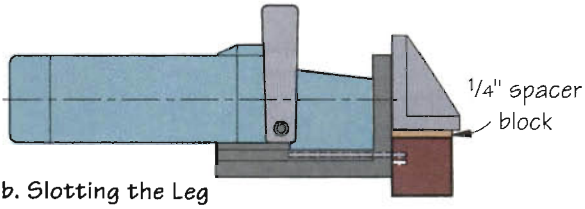


***Shape the ends of the long braces as shown here to fit around the legs. Use pan head screws and washers to attach the top through slotted holes in the braces.***

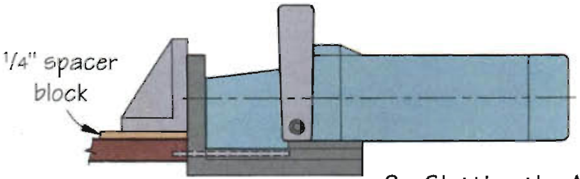
**Figure 2. Joining the Aprons to the Legs**



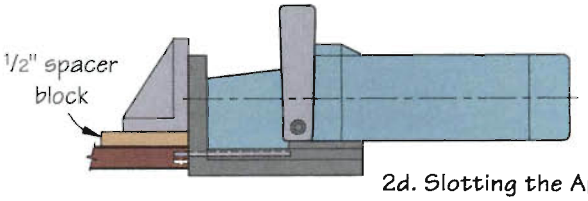
2a. Slotting the Leg



2b. Slotting the Leg



2c. Slotting the Apron



2d. Slotting the Apron

# A For

### by Dana Martin Batory

Given the price of lumber nowadays, it breaks my heart to throw away any piece of wood—no matter how small. Therefore, when I finished building a 26' X 6' deck at a lakeside cottage, I wanted to make good use of the wide selection of scrap 5⁄4 radius–edge pressurized deck boards sliding around in the back of the pickup.

How to make use of them was no problem. My mother had been pleading for a stool she could sit on while weeding her wildflower garden—one which would stand up to all kinds of weather and damp soil. This was a perfect use for pressurized lumber, since it's guaranteed to withstand decay, insects, and fungus attack "forever."

For my plans I referred to a pine stool made by my grandfather way back before the First World War. I figured if it could last through some 80 years of use and abuse, it had to be a well designed piece.

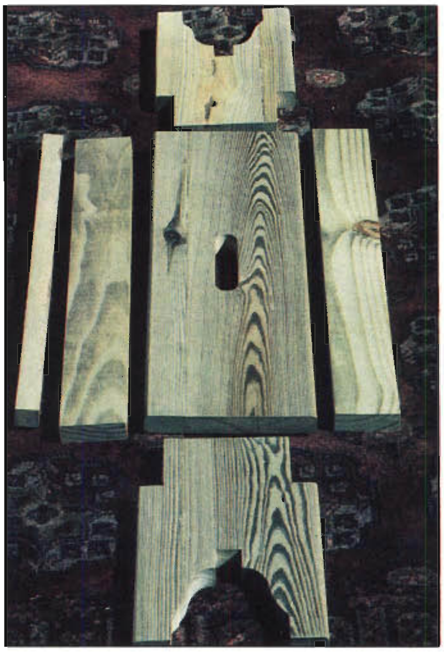
To make up the stool top and ends, my 6" wide deck boards had to be edge–glued. Though ordinary wood glue is not totally weather proof, it will hold the treated boards together long enough to machine them. Given the conditions, I prefer to use such glues as Contech's PL 500 deck and treated lumber adhesive. Establish one straight, working edge on each deck board with a table saw and/or jointer ripping each down to a 3½" width. The idea is to preserve the rounded edges for the outside surfaces. Glue and clamp. (In case you're not using 5⁄4 deck boards, adjust the dimensions to the material you have, and round the edges yourself with a router.)

Saw the other parts to size according to the Cutting List. Lay out the slot in the top (A), drill 1" holes at each end of the slot and cut out the center with a sabre saw. Lay out and cut the notches and curves in the end pieces (B) as shown on the full–size pattern in the PullOut™ Plans section in the center of the magazine. I've found a band saw is best for making these cuts. Lightly sand all pieces and check for fit.

The original stool was nailed together, but I decided to assemble the stool using ¼" pegs also made from the pressurized lumber. The 2" long pegs are made by simply driving small, hand–split billets through a ¼" hole in a ½" thick steel plate. They could also be turned on a lathe, whittled out or made with a plug–cutter on the drill press. If you decide to use nails, make sure they are galvanized and pre–drill the holes.

For accuracy I drilled all the holes on my drill press after clamping a ¾" piece of plywood onto its table to expand the working surface. Join the side braces (C) to the ends as shown in the figure (position the hole so that it won't interfere with the peg driven from above). Join the bottom braces to the ends as well (one peg at each end). Fasten the top to the frame (three pegs along ends and three pegs along each side). Sand the pegs flush to the surface.

For added beauty or protection, the stool can be stained with Olympic deck stain or treated with a preservative such as Thompson's wood protector after it has aged 6 to 12 months. PW



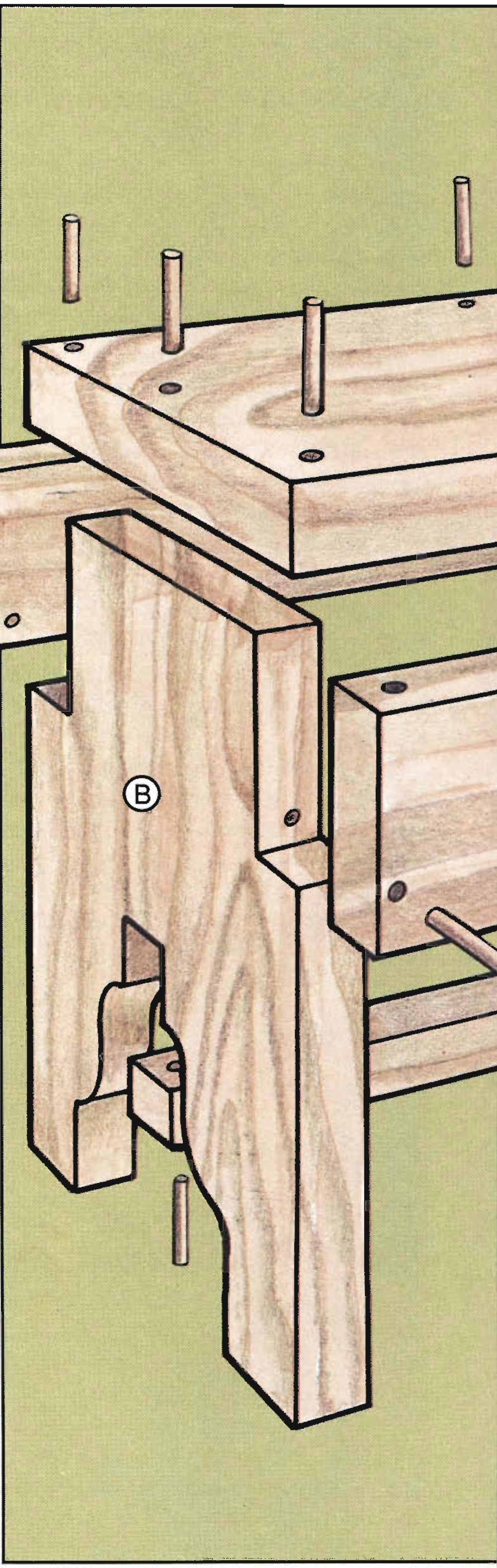


Illustration by Robert Chapla

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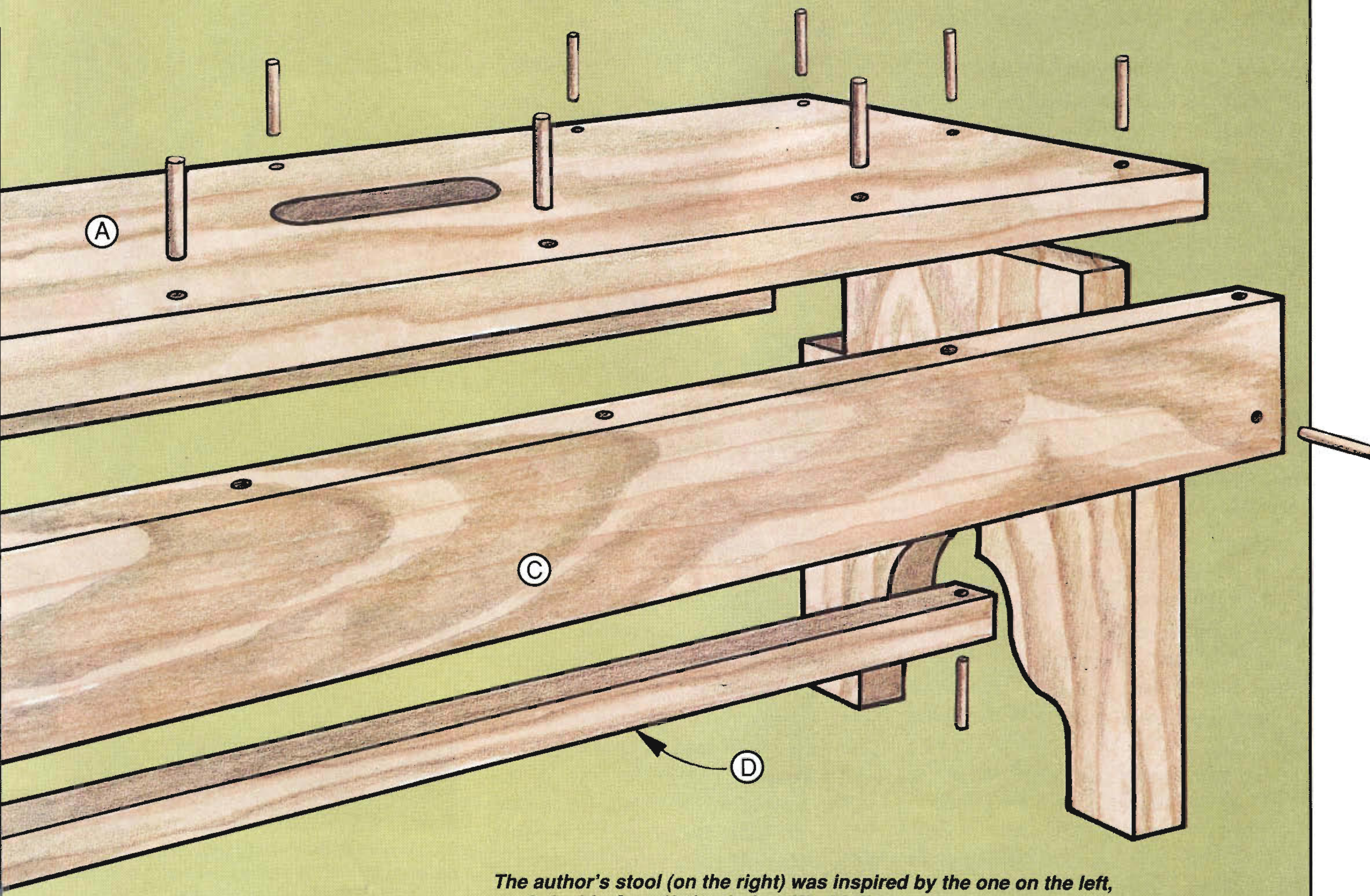
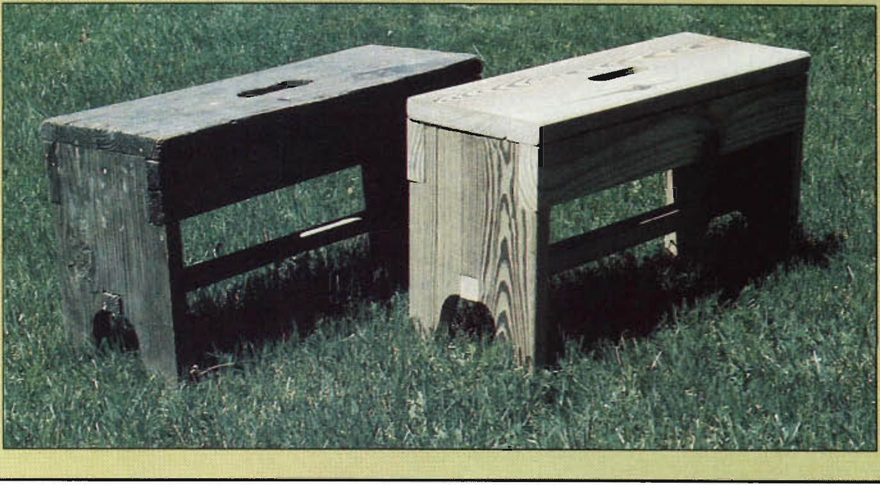
***Dana Martin Batory** is a woodworker in Crestline, Ohio.*

# ever Gardening Stool



| A Forever Gardening Stool | | | | | |
|---|---|---|---|---|---|
| **Cutting List** | | | | | |
| | | **Finished Size** | | | |
| **Qty** | **Part** | **T** | **W** | **L** | **Piece** |
| 1 | A | 1" | 7" | 20" | top |
| 2 | B | 1" | 7" | 11" | ends |
| 2 | C | 1" | 2 7/8" | 20" | side braces |
| 1 | D | 1" | 1" | 20" | bottom brace |

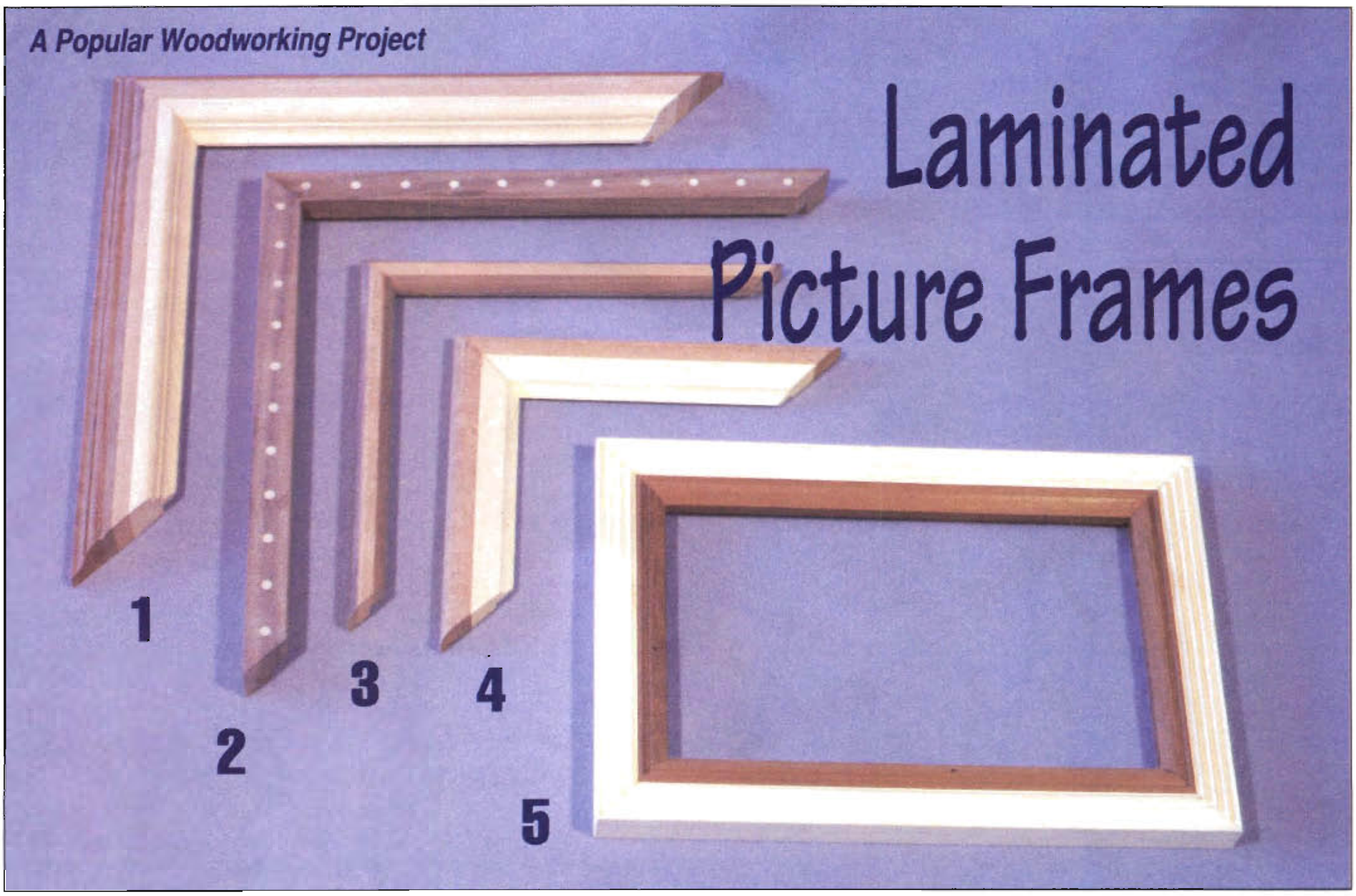
*The author's stool (on the right) was inspired by the one on the left, made by his Grandfather before World War 1.*



photos by the author

A Popular Woodworking Project

# Laminated Picture Frames



### by Jacob Schulzinger

Here's an interesting way to create unique picture frames that brighten up any wall. Using laminated stock you make yourself, a few standard router bits and some imagination, you can display your favorite photos and artwork to their best advantage.

The frame stock numbered one in the photo and the Figure is the most complex, consisting of four woods—walnut, mahogany, cherry and maple—arranged so that the colors in the frame advance from light to dark in regular stages. Using the same classical router bit on both the inner and outer edges, and with the lightest wood towards the inside of the frame, the progress of shades and colors nicely draws the eye towards the picture within.

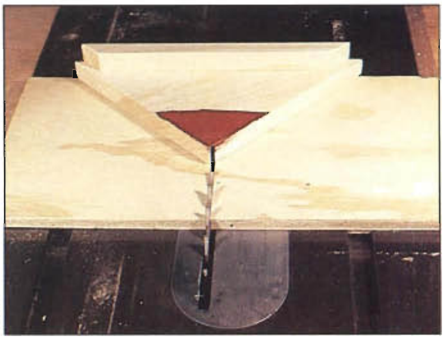
Because the finished stock size for this and most of the frames is fairly small, I suggest that you play it safe by making the laminated stock wide enough to split into two pieces of the same frame shape. This procedure gives you enough material to clamp securely in a bench vise for routing and to hold when running through a table saw.

Preparing the stock for the frame is easy to do. Rip three–foot pieces of different thicknesses about 3" wide and glue them together face to face. Make sure you clamp securely and spread the clamping pressure over as large an area as possible to prevent gaps in the glue joints.

The easiest way to handle these laminated pieces is to stack them on the bench top and clamp them directly to it with some scrap under the clamps to even out the pressure and protect the stock. Because the stock will slide while you're clamping, you'll need to trim the edges after the glue has dried. Slice the laminated block into pieces that are the thickness you want for the frames.

Shaping the material comes next, and while there are plenty of fancy router bits on the market, even the most ordinary can produce fine results. The laminated frame creates a new dimension of contrasting colors, and routing its surfaces merely enhances the effect.

Shapes that run across the face of the material are more safely done on a router table. Once you've formed the profile, cut a ¼" deep rabbet to receive the object to be framed. After that, it's a simple matter to rip the stock into two separate but identical sections on the table saw.


author

***This jig will make cutting miters quicker and more accurate. A more sophisticated and versatile mitering jig is described in "Project for the Shop" on page 32.***

Cutting the 45° angles is easy if you build a simple miter jig like the one shown above. This one took about 30 minutes to build from scrap. The base is a piece of ½" thick plywood with a strip of ¾" wide material glued and tacked to its bottom and positioned to slide in the saw table slot.

The workpiece support is made from a section of ¾" thick pine with one end cut to a perfect 90° angle. Cut this 90° corner from the end of a board so as to form a

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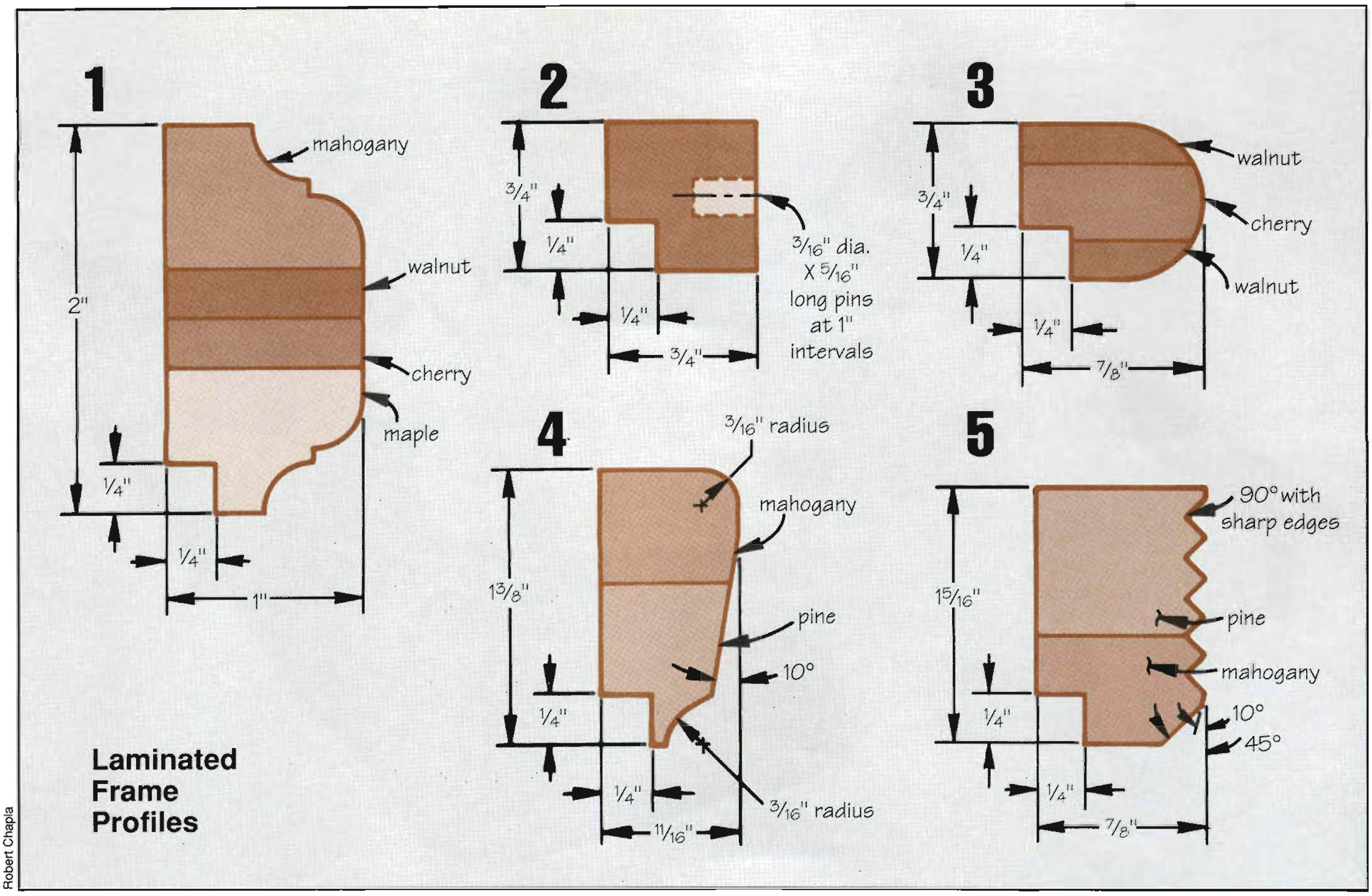
***Jacob Schulzinger** is an industrial engineer in the aerospace industry. Woodworking is his part–time business and hobby.*



**Laminated Frame Profiles**

Robert Chapla

triangle. Position this block so that the square corner is about in line with the center of the saw blade. Use a single wood screw to hold one of the base corners in place so the support can be rotated to form the perfect angle for cutting.

With the unit in position, advance the plywood base and make a saw cut into it; then use that saw cut to align the material support. A second screw temporarily holds the two pieces together for a test cut. If the angle isn't quite right, remove the temporary screw, adjust the position of the support, and place a new temporary screw in position for the next cut.

Repeat this process until the cuts made on scrap stock on both sides of the tool are exactly the 45° needed. Now add a few permanent screws to insure that the unit won't move. I glued and nailed a simple hand grip to the back of mine to make it easier to use, and then splashed some bright red paint where the blade enters the support to remind me to take extra care when using it. For a more sophisticated miter jig, see the article that follows this one.

After experimenting with stock glued up from numerous species, I found that simple frames laminated from only two different woods offered plenty of possibilities. I use pine, maple, walnut, cherry and mahogany in thicknesses from ¼" to ¾".

Frame number two is made from a piece of ¾" square walnut stock with 3/16" diameter maple dowel pins inlaid at 1" intervals.

Setting the pins is easy if you make a drill spacing guide. Drill two holes 1" apart on the centerline of a piece of scrap. Nail or screw two more pieces to it, one along each edge so the resulting cross–section is an upside–down U. The pieces should be dimensioned so the jig sits snugly over the frame stock. Clamp the jig to the drill press table so the bit enters one of the holes precisely, and the frame stock slides through. Make an indexing pin from a dowel the same diameter as the drill holes, and use it to pin the guide to the frame stock by inserting it in the previously drilled hole. As you drill and slide the stock through, each hole will be the same distance from the previous hole.

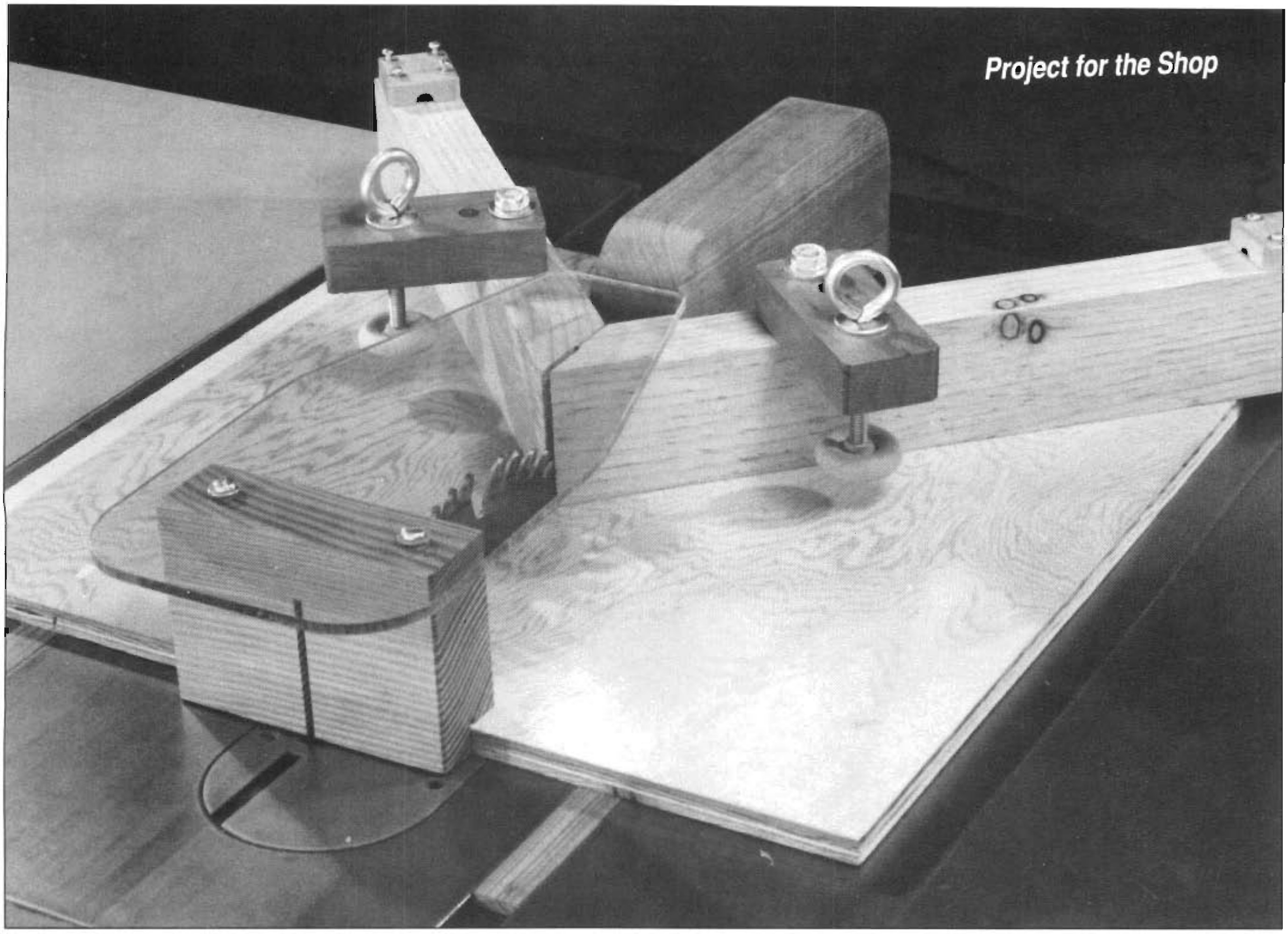
With holes in the walnut drilled to about 5/16" deep, I inserted the maple dowels in each hole with just a dab of glue. After the glue has dried, pass the stock through the table saw to trim off the rough pin ends. Make sure you balance the miter cuts around the pin positions for the best appearance.

The third frame is made from a piece of 3/8" thick cherry sandwiched between a pair of 3/16" thick walnut boards. Round the end with a full radius cutter.

Frame number four is made from pine and mahogany. Cut a 10° bevel on the face of the frame and round the edges with a 3/16" bit.

The last frame, shown completed, was the most intriguing to make. It has a pair of short bevels on the inside edge and a series of 90° grooves routed into the face. No rounded edges were used and the play of light across the sharp points of the grooves creates an interesting pattern of shadows.

Finishing the frames is a matter of personal preference. While some frames beg for a soft matte finish, others just won't look quite right unless they have a glossy glow. As easy as these are to build, you'll find yourself swamped with work as soon as you see just how nicely they show off those photos and prints packed away in the closet.



# An Advanced Miter Jig

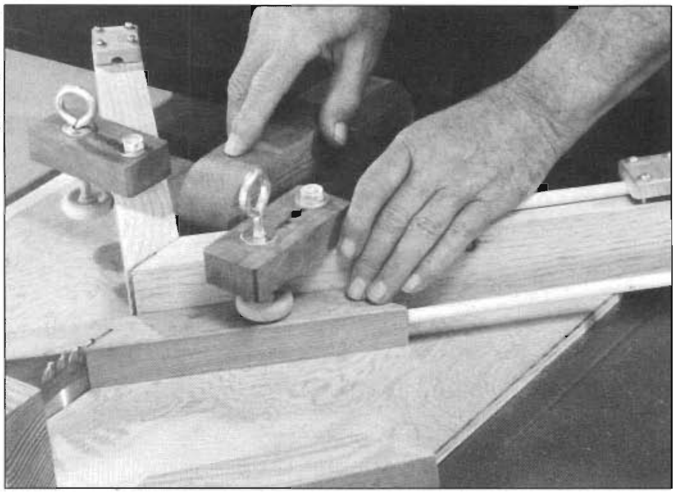
### by R. J. DeCristoforo

Cuts for miter joints must be made with precision or the angle between components will not be 90°—even though the sawed edges may come together nicely. A simple square or rectangular frame requires eight cuts. If they are off just a fraction of a degree, the error is multiplied by eight, as you'll discover during assembly. That's why a miter jig is an essential project for anyone owning a table saw. The special value of this jig is in its sliding table and fixed fences. Workpieces are positioned accurately and move together with the jig, so that most of the errors that can occur when using a miter gauge—especially those caused by "creep"—are eliminated. Furthermore, dual fences allow you to miter molded pieces without the fuss of having to reset a miter gauge or move it from table slot to slot.

This jig follows the basic miter gauge concept but has additional features including a see-through guard for safety, adjustable hold-downs for extra work security, and stop rods you can attach to either fence to gauge lengths when cutting many identical pieces. Careful layout, sawing and assembly are required; make it right and you'll have a valuable lifetime accessory.

Start by cutting two hardwood strips (A) that will fit nicely in

photos by the author



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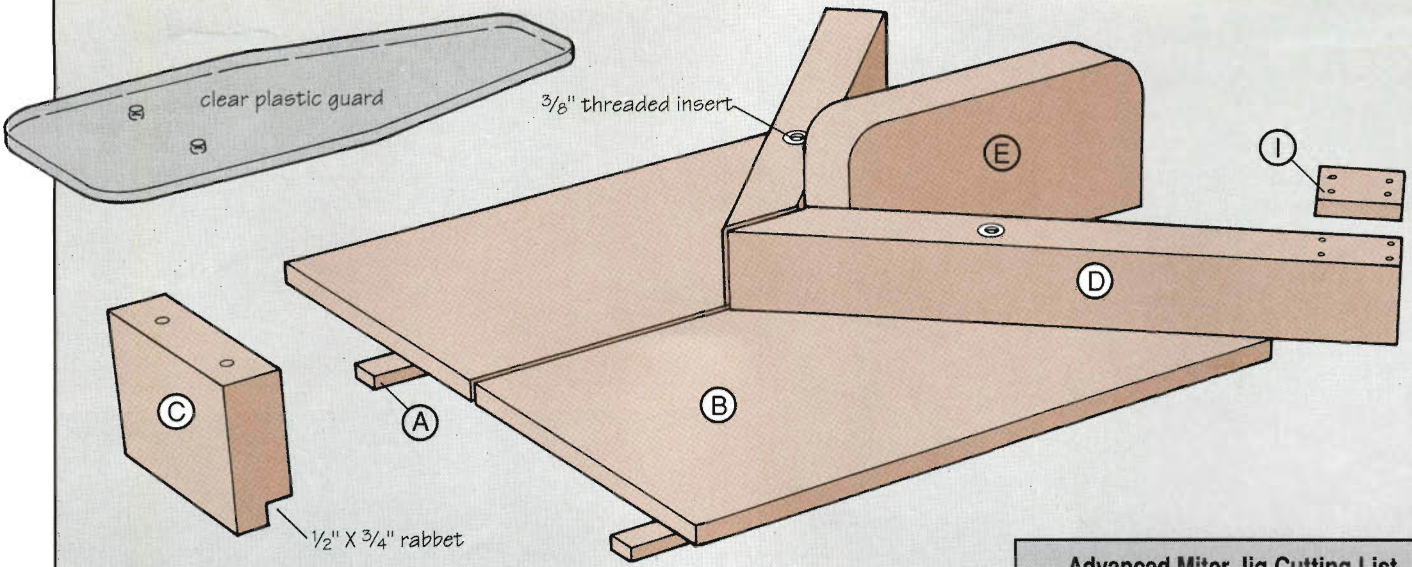
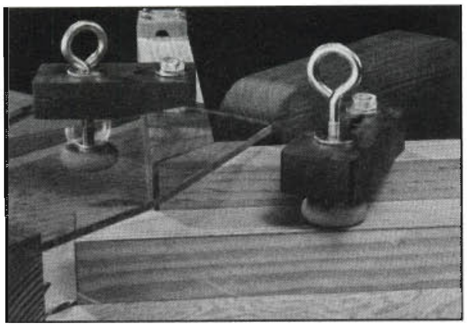
*R. J. DeCristoforo is the author of many woodworking books, including* Housebuilding *and* Build Your Own Wood Toys *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*



illustrations by Tom Larson

See the PullOut™ Plans for a full-size pattern of the clear plastic guard.

**Figure 1. Assembly**



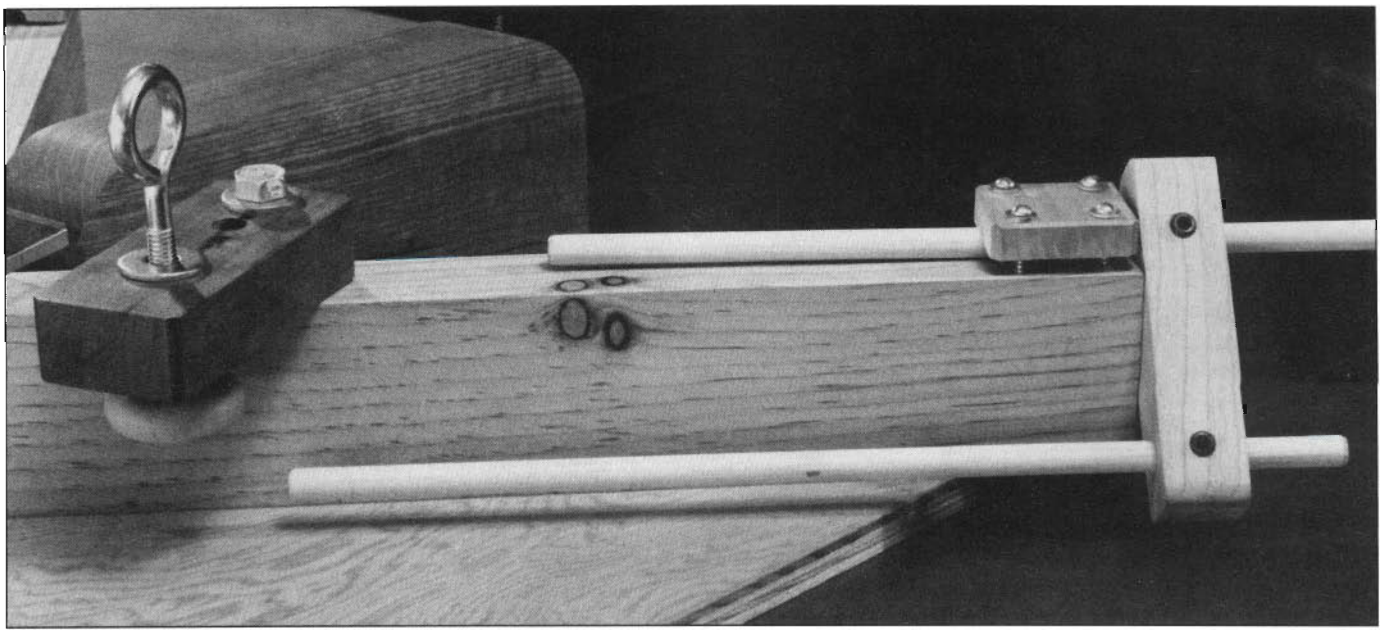
| Supplies | |
|---|---|
| 1 | ¼" X 6" X 12" Lexan™ (clear plastic) |
| 2 | ⅜" threaded inserts |
| 2 | 5⁄16" X 4" eye bolts and washers |
| 2 | ⅜" X 2" bolts and washers |
| 2 | 5⁄16" tee–nuts |
| 2 | #6 X 1" round head screws and washers |
| 8 | 5⁄16" X ½" Allen head screws |
| 2 | 1" sheet metal screws |

*The hold–downs swivel and have extra holes for different size workpieces. Their pads can be readymade toy wheels. The stop rods clamp to either of the jig's fences.*

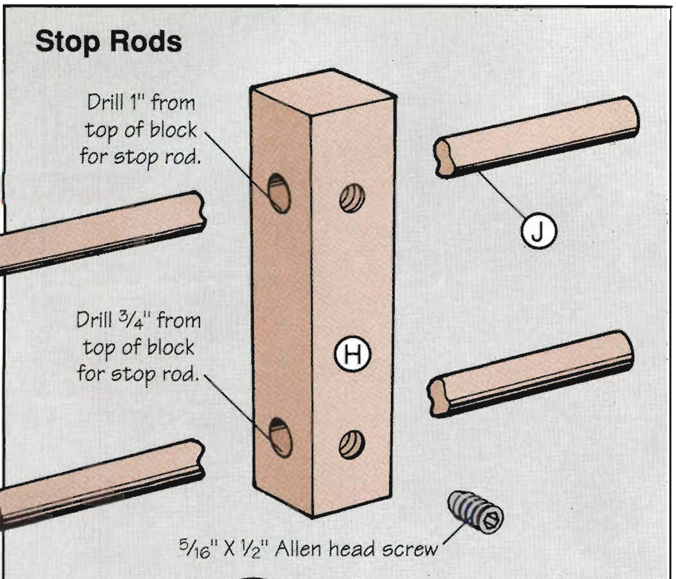
**Advanced Miter Jig Cutting List**

| | | Finished Size | | | |
|---|---|---|---|---|---|
| Qty | Part | T | W | L | Piece |
| 2 | A | *⅜" | *¾" | *21" | guides |
| 1 | B | ½" | 16" | 18" | platform |
| 1 | C | 1½" | 3½" | 5" | guard support |
| 2 | D | 1½" | 2½" | 16" | fences |
| 1 | E | 1¾" | 4" | 9" | pusher |
| 2 | F | 1" | 1½" | 4" | brackets |
| 2 | G | ⅜" | 1½" dia. | | hold–down pads |
| 1 | H | 1" | 1" | 4½" | stop rod holder |
| **1 | I | 1" | 1½" | 2" | stop rod clamp |
| 2 | J | ⅜" diameter | | 13" | stop rods |

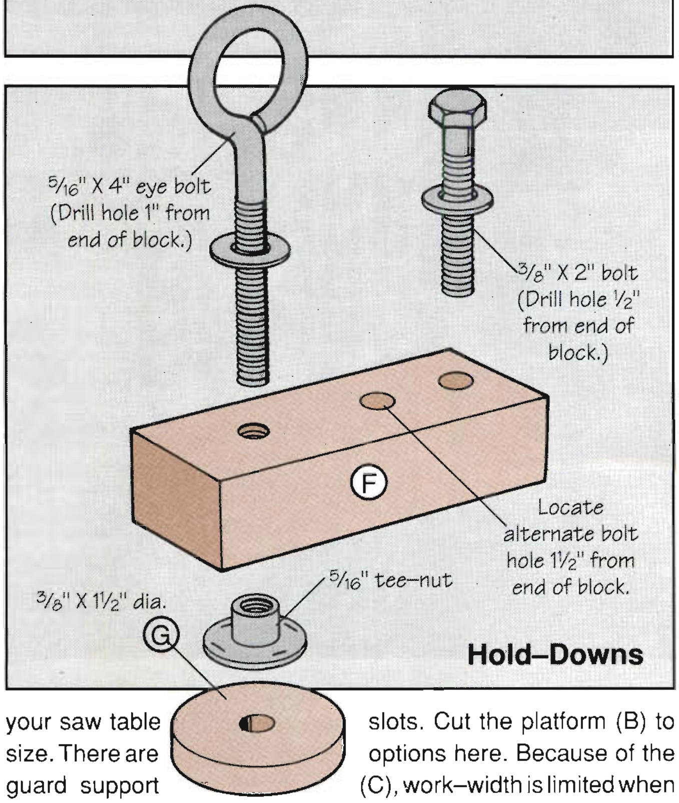
*size to fit your table saw slots **makes two parts



## Stop Rods


Drill 1" from top of block for stop rod.
J
Drill ¾" from top of block for stop rod.
H
5/16" X ½" Allen head screw

Tom Larson


5/16" X 4" eye bolt (Drill hole 1" from end of block.)
⅜" X 2" bolt (Drill hole ½" from end of block.)
F
Locate alternate bolt hole 1½" from end of block.
5/16" tee–nut
⅜" X 1½" dia.
G

## Hold–Downs

your saw table slots. Cut the platform (B) to size. There are options here. Because of the guard support (C), work–width is limited when you must miter at a mid–point on a long piece. For greater capacity you can increase the length of the platform by several inches. If you do, be sure to increase the length of the plastic guard.

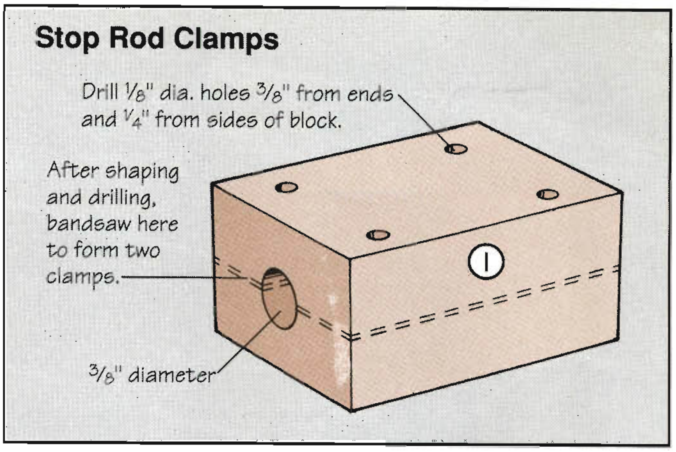
Place the guides in the table slots and then position the rip fence 8" from the center of the blade. You want to position the platform against the fence so the kerf of the miter cut will be on the platform's centerline. Drive a few ¾" brads through the platform into the guides, invert the assembly, and attach the guides permanently with three #4 X ¾" FH screws. Use smaller screws if you *need* to drive them deeper than the surface of the guides.

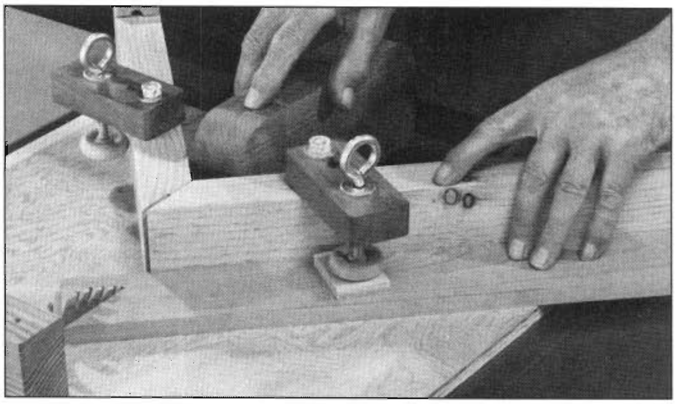
Cut and shape the fences (D) and the pusher (E), and position the platform in place on the table. Draw a line parallel to and 7" away (more if you have made a longer platform) from the front edge of the platform. Saw a kerf to that line. Use an accurate 45° triangle to mark the fence positions. Drill for and install the ⅜" threaded inserts before attaching the fences with #7 X 1½" FH screws driven up through the bottom of the platform. Be sure the fences form a 90° angle that is split by the kerf in the platform. Add the pusher with similar size screws, but be sure to use them well away from the front edge of the part so they can't be hit by the saw blade. Make and add the guard support (C) and then, with the saw running, move the jig to form the kerf that is needed. Lexan® is a good material for the guard, but any type of rigid plastic will do. Remember that if you've made a longer platform, the guard length should be altered to suit.

Construction facts for the holddowns (F and G) and the stop rods (H, I and J) are supplied in the detail drawings. The set screws for the stop rods will hold sufficiently if you place a drop of oil on them and drive them into slightly undersize holes.

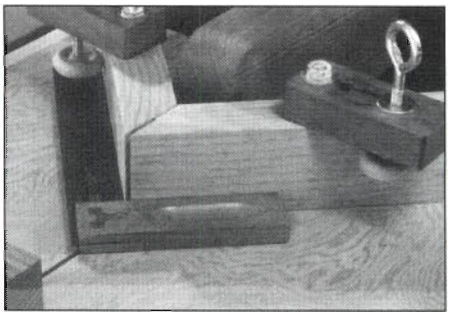
All components should be carefully sanded before and after assembly. Finish with several coats of clear sealer, sanding lightly between applications and after the final one. It's a good idea occasionally to polish the bottom of the platform and the guides—and the surface of your saw table—with paste wax. PW

## Stop Rod Clamps


Drill ⅛" dia. holes ⅜" from ends and ¼" from sides of block.
After shaping and drilling, bandsaw here to form two clamps.
I
⅜" diameter



***Hold–downs secure the workpieces against the fence. Thin pieces may need a spacer between the pad and the work—or use a longer eye bolt.***



***The fences must form a 90° angle split by the kerf in the platform.***

photos by the author

# Swiss Style Chip Carving

### by George Weber

Chip carving is one of the oldest and most widely practised forms of wood carving. Examples of it can be found on South Pacific canoe paddles, Egyptian mummy cases, and many decorative and useful objects throughout Europe. The Alpine Swiss in particular have brought chip carving to a high degree of precision and delicacy, raising it to the level of a fine art that might well be called "wood engraving." It is not uncommon in Switzerland and upper Austria to find the interior of homes highly decorated—ceiling beams, door frames, cabinet doors, chairs, tables, even milking stools are often richly embellished with carvings that the Swiss call "Kerbschnitzen."

Swiss carvers use linden, a close relative of basswood, and ahorn, a clear white wood of the maple family. Although many woods can be chip carved successfully, chip carvers in this country prefer northern–grown basswood. It's very straight–grained and holds detail nicely without splitting and it has no prominent grain pattern that might conflict with the carver's design. Since the wood is very light in color, the contrasting play of light and shadow created by the carving is enhanced. Also, it's not so hard that working it soon becomes overtiring—chip carving is done with only hand and arm power.

Basswood grows across a large area of North America, from the southern Appalachian states up into Canada. Northern basswood is best because the colder climate means slower growth, resulting in wood which will take and hold fine detail. Thus areas like Wisconsin and Minnesota produce basswood with a dense, clear grain, ideal for chip carving.

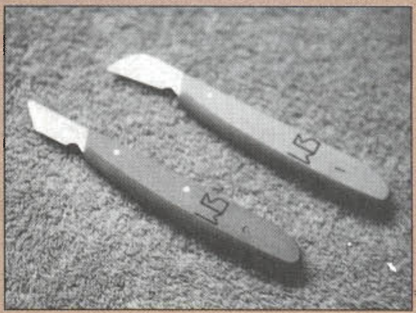
The tools and equipment required are simple—two knives, sharpening stones, a good compass, a ruler and a small T–square, and a soft lead pencil and eraser. The two knives used in chip carving are unique, and are the only ones you'll need. You may have seen sets of ten or more "Chip Carving Knives" in catalogs, but in my opinion they are entirely unnecessary. All you need are the two Kerbschnitzern knives made by Klötzli in Burgdorf, Switzerland, and they are not found in these sets. They were designed by Christian Rubi, the former director of the Woodcarving School in Brienz, Switzerland, and are made only at the Klötzli Messerschmiede in Burgdorf. They are imported into this country by Wayne Barton, generally acknowledged to be the foremost chip carver, lecturer and teacher in this country, and sold through his Alpine School of Woodcarving (225 Vine Ave., Parkridge, IL 60068, tel. 708–692–2822) and in various catalogs, including Garrett Wade, Woodcraft and Trend–Lines. You can also obtain the basswood plate blank shown in the photo above from Barton.

*__George Weber__ is a professional woodcarver in Magalia, CA*

## Chip Carving A Gothic Design

### by George Weber

In Switzerland and Germany, chip carvers have traditionally plied their craft on just about anything and everything made of wood. Household objects, especially chests and boxes, are favorites, and a small box project is a good way to get started once you've practised the basic cuts on scrap wood. You can purchase basswood boxes ready to carve, or make your own. I mail-ordered the box pictured on page 37 from Gottlieb Brandli, Swiss Cabinetry, N. 2571 Coplien Road, Monroe, WI 53566, tel. 608-325-6681 (#6 basswood box, 5" X 5" X 1¾", $17.25). A carved box like this makes a great gift or addition to your desk or dresser top.



author

continued on the next page

The two knives—the cutting knife and the stab knife—are quite different. Ninety five percent of your work will require the cutting knife. Shallow cuts, deep cuts, straight cuts, curved cuts—it does them all. The stab knife is unique in that it has three bevels. It's simply stabbed vertically into the surface, leaving a triangular *impression and* separating the fibers without removing any wood. As with any knives, proper sharpening is essential. The cutting knife is sharpened to about a 7° or 8° bevel on both sides. Take care to keep the cutting edge absolutely straight, and never round off the point. Any stone you use must be perfectly flat—a stone that has a belly in it will ruin the shape of the knife. The stab knife should be sharpened at about a 40° angle.

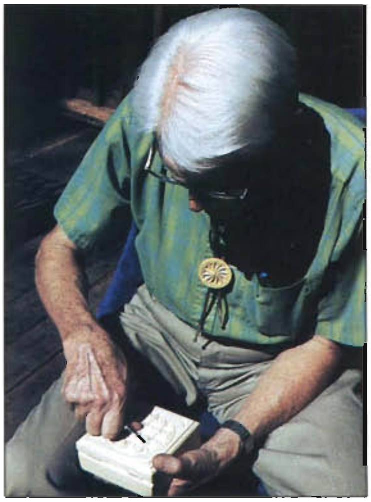
No workbench or clamping devices are needed. You hold the work on your knee with one hand and carve with the other. Sitting in a straight chair will give your arm full movement for smooth cuts.

To get uniform cuts, grip the cutting knife so the blade is at a 60° angle to the wood. This is best achieved by wrapping your fingers around the handle and resting the first knuckle of your forefinger on the wood. The first knuckle of your thumb should rest at the front end of the handle while the end of the thumb rests on the wood.

Perhaps the simplest and most basic pattern commonly used in chip carving is the "Dreischnitt" or three–cut. This simple series of cuts removes a triangular chip, and by varying the direction and spacing of these cuts, you can make different border designs such as the positive diamond, the negative diamond, the zig–zag and many others. Single, double and triple lace border patterns require both curved cuts and diamond and half–diamond cuts. The rope design is another well known curved cut border. Once the chip carver has learned border design and execution, grid designs follow. They start with straight lines, usually about one to two millimeters wide, and are cut freehand. The secret of carving straight lines is to keep your eye ahead of the blade—which will automatically follow where you are looking (with a little practice). Wayne Barton's two excellent books, *Chip Carving: Techniques and Patterns* and *Chip Carving Patterns*, (Sterling Publishing Co., 2 Park Ave., New York, NY 10016) clearly illustrate these designs and techniques. Rosettes are a bit more difficult, but the possible patterns here are endless, and designing new ones is half the fun. Chip carvers also utilize free–form designs from nature—flowers, leaves and vines, animals and birds and the like. And chip carving is particularly effective for all kinds of incised lettering, whether Roman, Old English, or script styles.

You draw the design directly on the wood surface with a soft pencil. Any marks remaining after carving are simply erased. All sanding must be done to the bare wood *before* carving, since sanding afterwards will flatten out the crisp ridges that characterize good Kerbschnitzen. Complete your carvings with a durable, clear finish. Four or five light spray coats of satin or dull polyurethane is best.

Like all woodworking techniques, chip carving takes desire, a little instruction, and practice, practice, practice. It differs not only in the minimal number of tools required, but also in the speed with which practice pays off. Results come more quickly here than with perhaps any other method of woodworking.



## Chip Carving A Gothic Design, continued

### Build the Box

To make yourself a box on which to Kerbschnitzen, you'll need a couple of board feet of basswood. If you can't find a local source, you can get ½" basswood in 4" to 9" widths from Constantine's (phone 800-223-8087).

Start by ripping material for the sides (A) to width. Next, set up to cut a ¼" wide X ¼"+ deep groove. A table saw will work for this, but you'll use a router for later stages of the project, so you might as well set it up in your router table to do this.

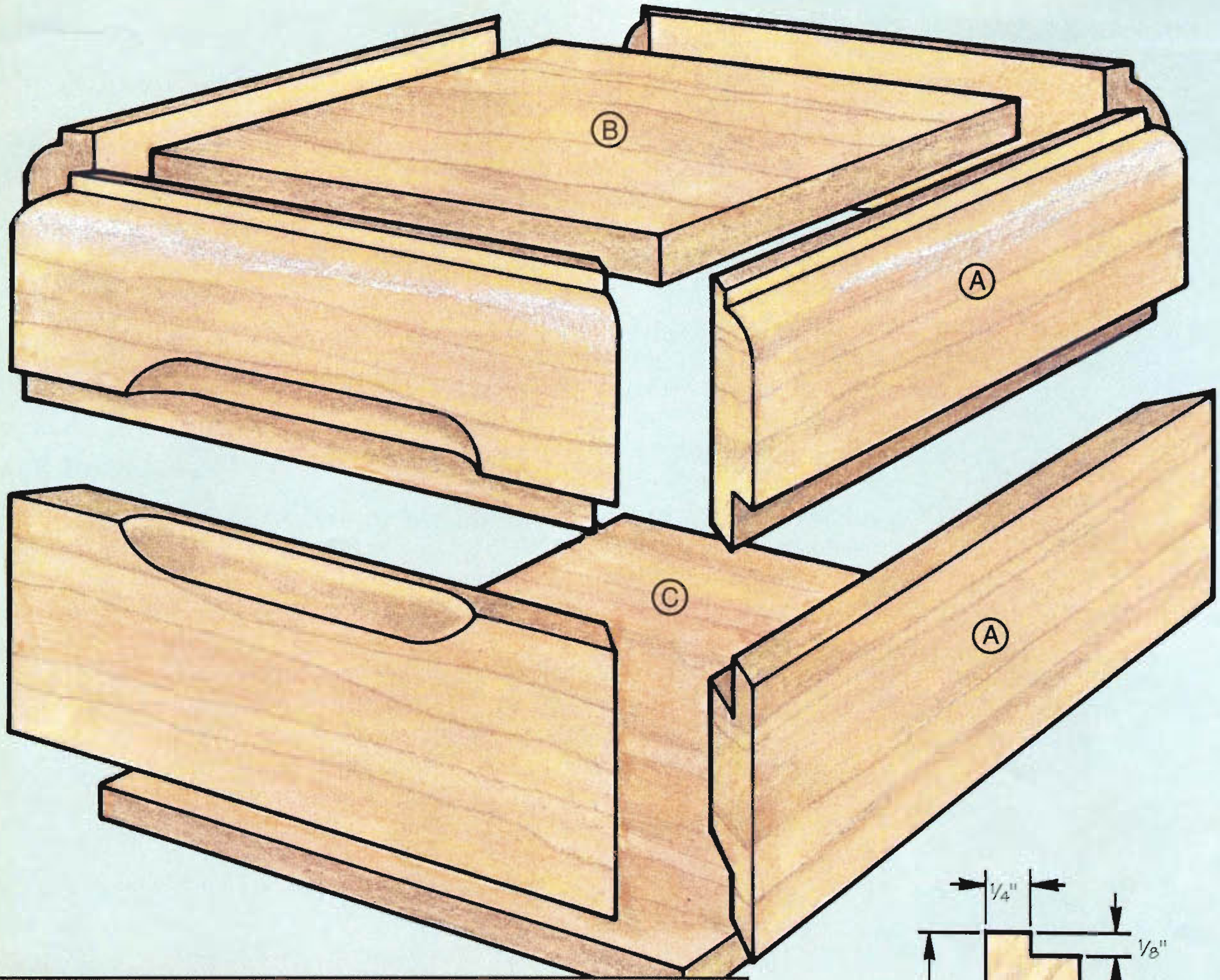
Position the fence 1 1⁄16" from the bit and make test cuts in some scrap. Cut this groove on both surfaces of the side material, as shown in the Figure on the next page. After you've assembled the box, you'll rip the sides down their center to separate the lid from the box, and these grooves that you're routing now will turn into rabbets that allow the two pieces to nest together. You want just 1⁄16" or so of material between the dadoes so you can rip through it in one pass. When this is done, shift the router table fence over so that just a little more than ⅛" of the bit is exposed, and rout the rabbet for the bottom (B).

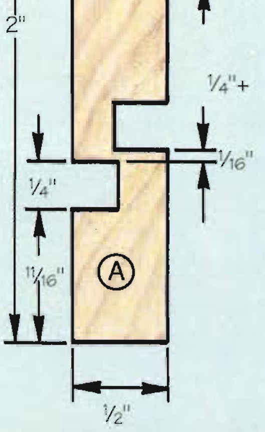
Now cut the sides to their finished length with both ends mitered at 45°. Cut the top (C) from basswood to fit within these mitered pieces and the bottom (B) from tempered hardboard to fit in the rabbet.

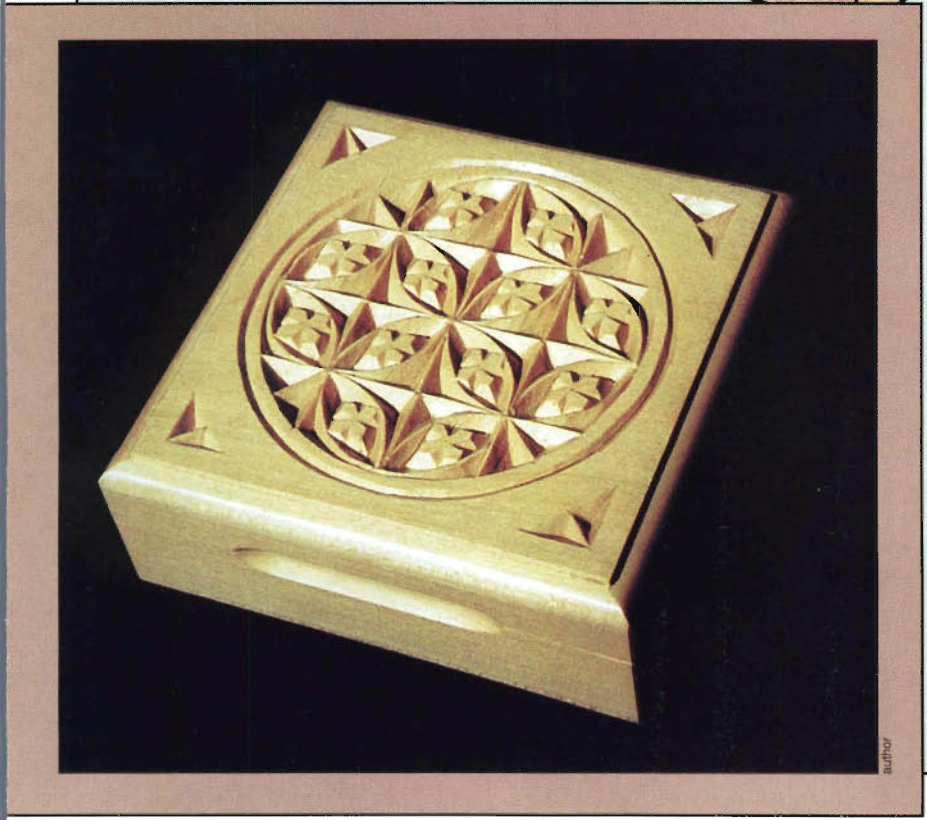
Spread glue on all four edges of the top, and lay it top down on a piece of wax paper on the workbench. Glue the mitered ends of the side pieces and position them around the upside-down top. Position a band clamp around this assembly, and glue the bottom in place to square it all up.

When it's dry, scrape of any excess glue, sand everything, then rout the thumbnail profile around the top with a ¼" roundover bit set to cut a fillet. Now cut the lid from the box by setting the table saw fence 1" from the center of the blade and cutting through all four sides. If you like, you can rout a shallow finger pull in the front of the box like the one in the photo. remember though that you've only got ¼" of material because of the rabbet on the inside of the lid. If you want to hinge the lid, you may need to round the edge of the lip inside the box to allow it to pivot.

Now you're ready for the design and carving steps described on page 38.

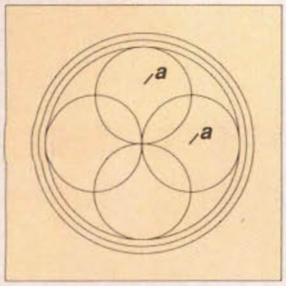


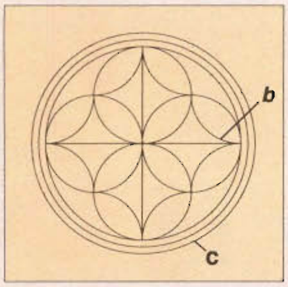


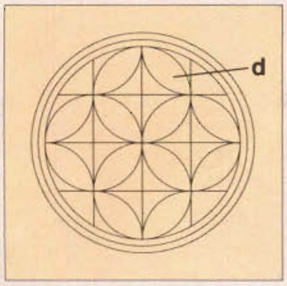

author

**Box Cutting List**

| Qty | Part | Finished Size | | | Piece |
|---|---|---|---|---|---|
| | | T | W | L | |
| 4 | A | ½" | 2" | 5" | sides |
| 1 | B | ½" | 4" | 4" | top |
| 1 | C | ⅛" | 4½" | 4½" | bottom |







## Lay Out the Pattern

You can simply transfer the pattern provided in the PullOut™ Plans to the top of the box if you like, but part of the fun of chip carving is laying out and drawing the design directly on the wood.

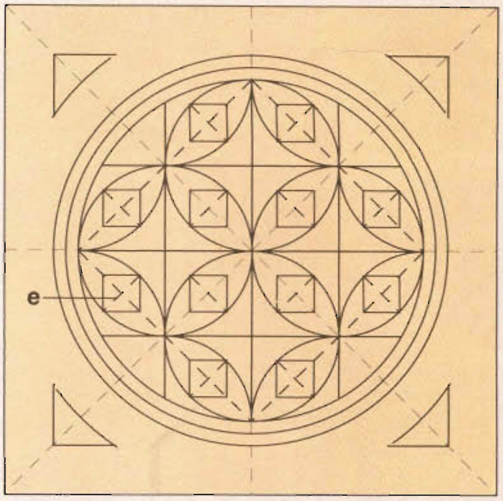
Here's how: start by drawing exact diagonals lightly with a soft lead pencil on the box top. Then draw another pair of lines, here marked **a**, from the midpoints of the sides through the centerpoint. Now, using a good compass and starting from the center, draw a circle with a 2" radius, another with a 1⅞" radius, and a third with a 1¾" radius.

Along lines **a**, halfway between the box center and the circumference of the 1¾" circle, draw four ⅞" radius overlapping circles. Complete the pattern of circles by establishing centerpoints from which to draw arcs **b**. With the compass still set for a ⅞" radius, locate its point at those circle intersections nearest the large outer circles and draw tiny arcs (**c**). The intersections of these tiny arcs mark where to locate the compass point to draw the remaining arcs in the pattern (**b**).

Now draw vertical and horizontal lines through the midpoints of lines **a**.

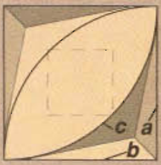
To inscribe the small squares in the "ovals" formed by the intersecting circles and arcs, first draw guidelines **d**, and **e** (large drawing above and to the right). Then draw the squares.

Finally, lay out the corners by swinging a 2⅜" radius arc from the centerpoint so it intersects the diagonals. The points of the corners should be about 2¾" from the centerpoint.

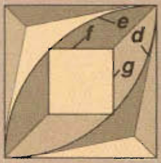


## Carve the Design

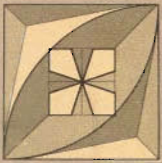
Using the grip described in the accompanying article, hold the cutting knife so it maintains a 65° angle to the surface of the wood. Always take out the largest chips first. In this design, remove the triangular chips that define the four crosses by making cuts **a**, **b** and **c**.



After you've removed all 16 of these chips, carve out the pieces from each end of the "ovals," leaving a square in the center of each. These cuts are here marked **d**, **e**, **f** and **g**.



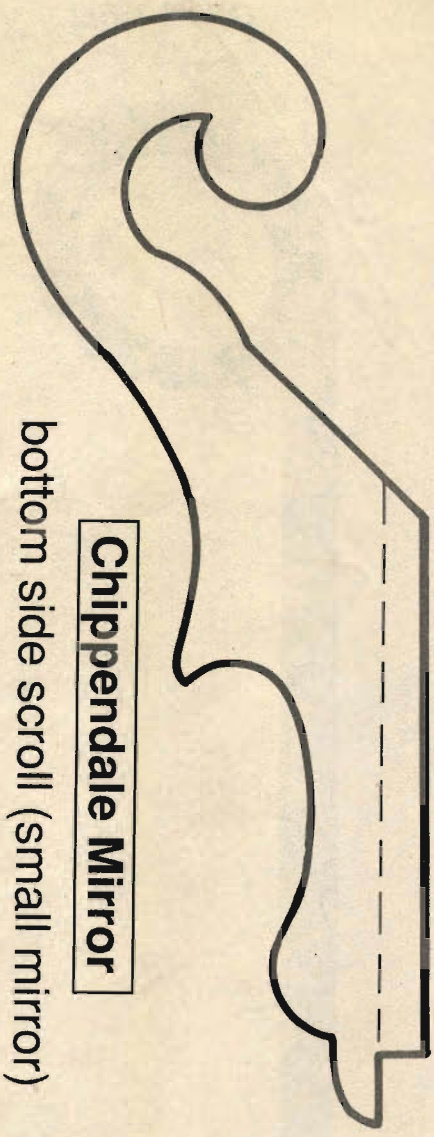
Turn the squares into a geometric floral design by making a simple two–stroke cut to remove a triangle from each side of the squares.



Remove the triangular chips with three cuts in the remaining areas just inside the perimeter of the circle to complete the Gothic design. Cut a V–shaped groove between the 4" and 3¾" circles all the way around. Carve out the pair of triangular chips near each corner and you're finished.

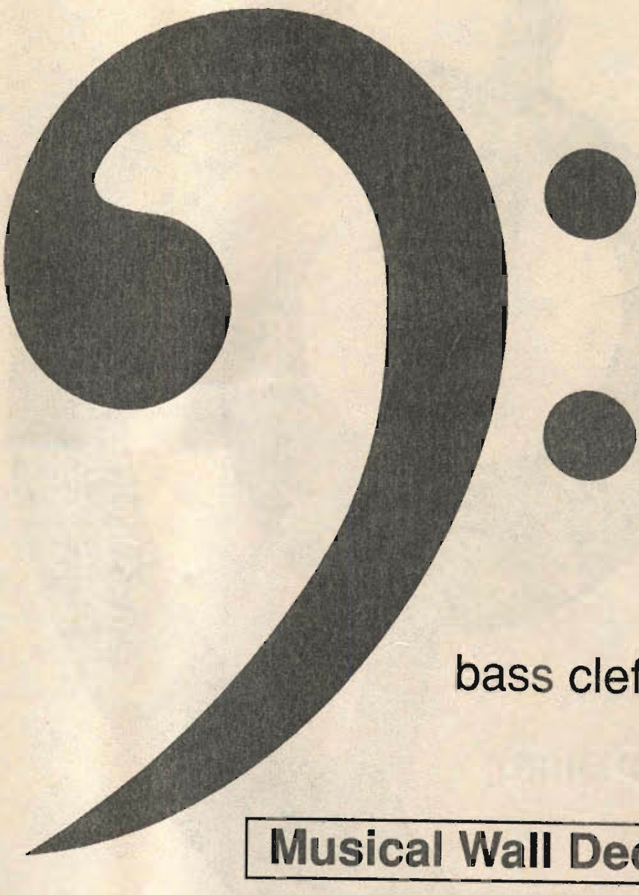
Erase any pencil marks that may still show, being careful to not break off any of the crisp ridges. Four or five spray coats of a dull or satin polyurethane completes the project. PW

**PullOut™ Plans**
Popular Woodworking No. 61
July 1991
Pages 39—54



**Chippendale Mirror**

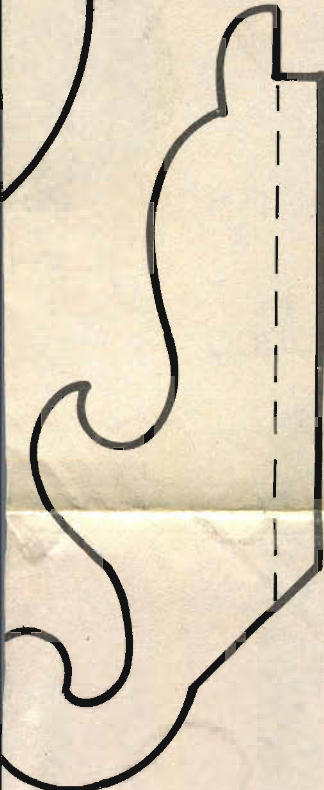
bottom side scroll (small mirror)



bass clef

**Musical Wall Decor**

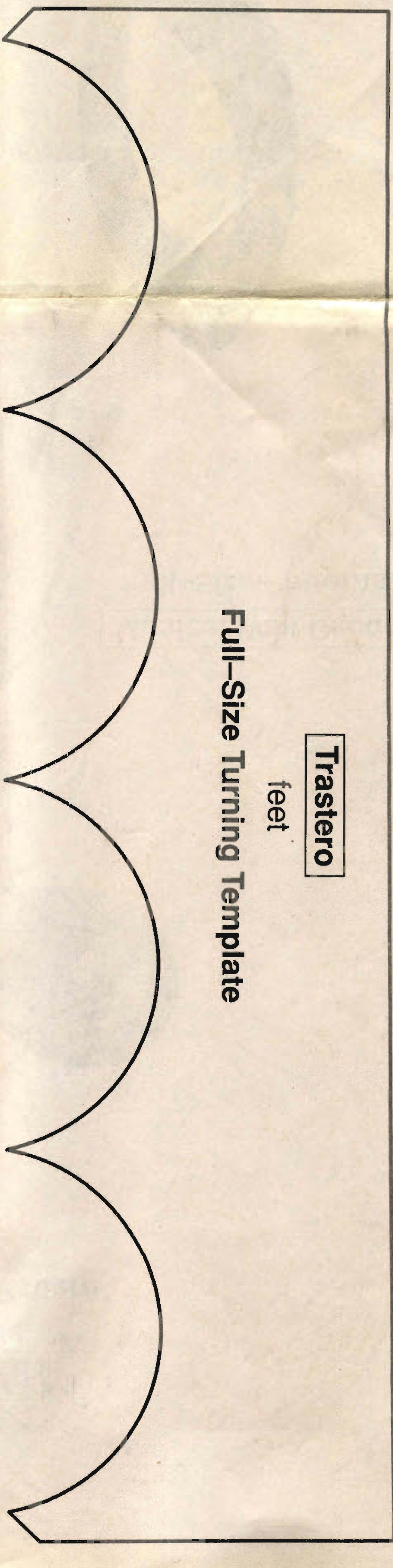
**Full–Size Patterns**



**Chippendale Mirror**

top side scroll (small mirror)

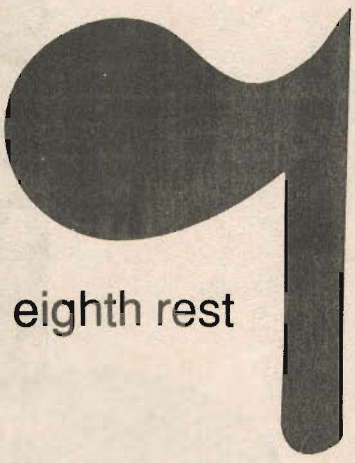
**Full–Size Pattern**



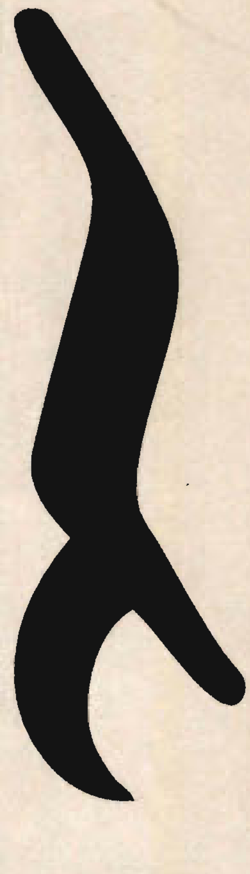
**Trastero**

feet

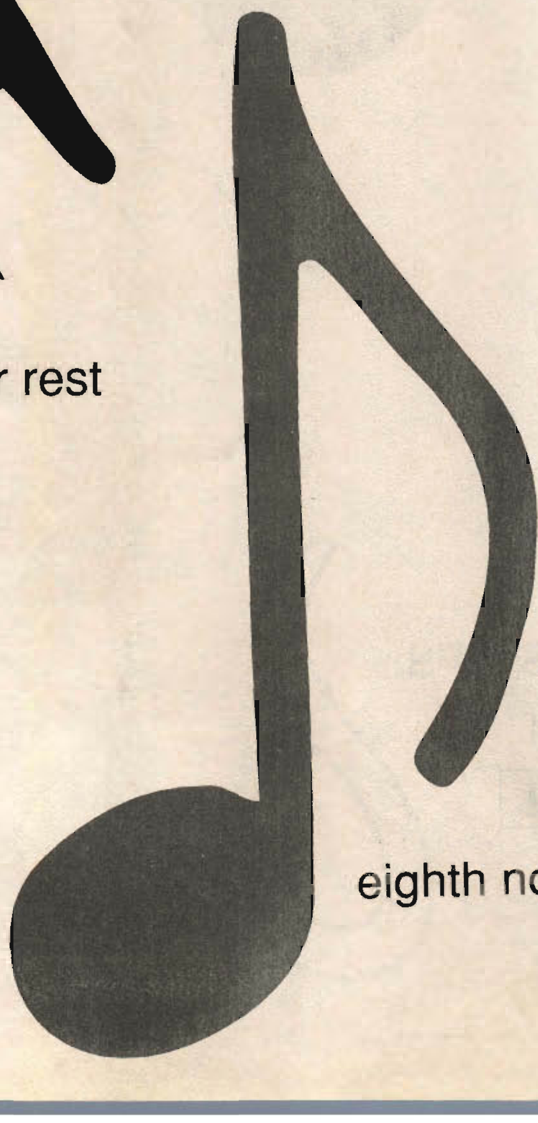
**Full–Size Turning Template**



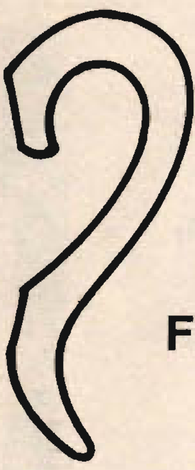
eighth rest



quarter rest

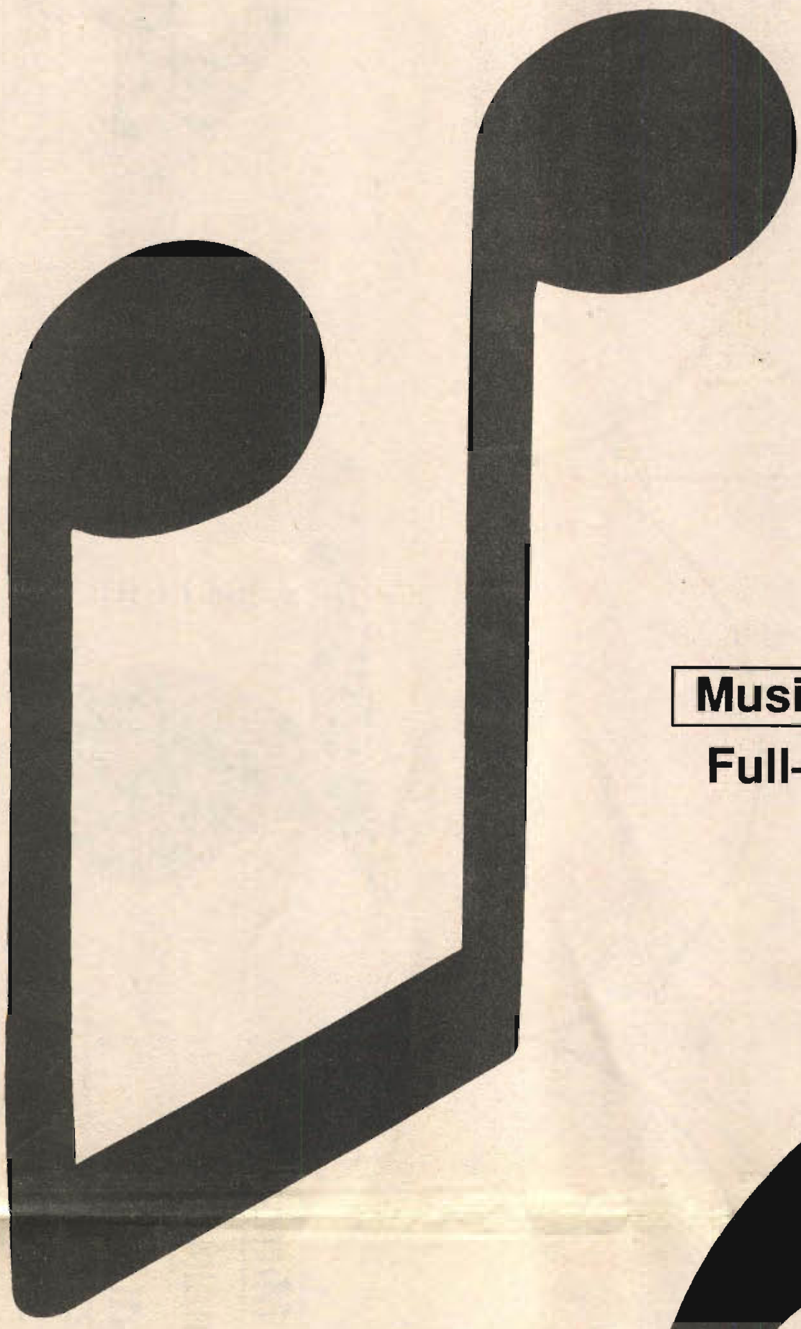


eighth note



**Teacup**
handle
**Full–Size Pattern**

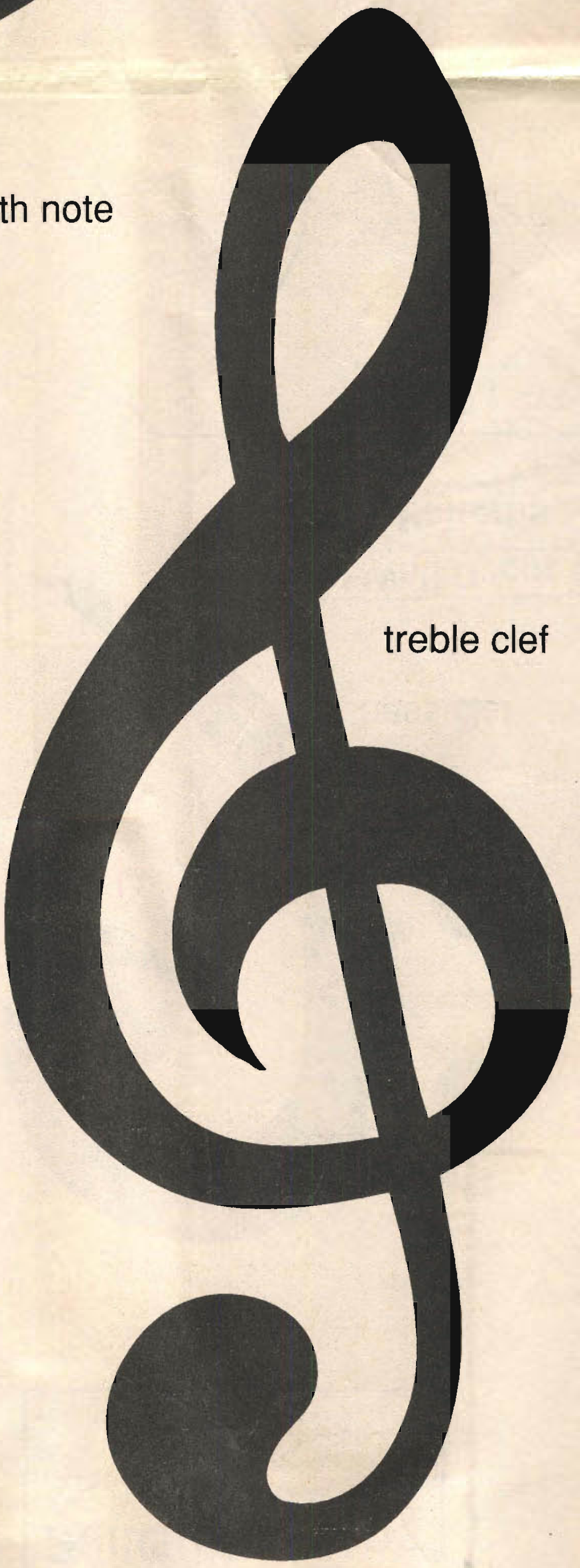
**te**



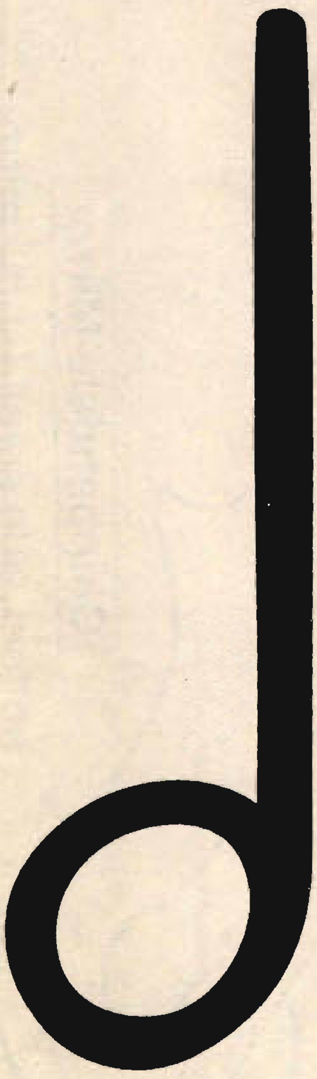
doubled treble eighth note

**Musical Wall Decor**
**Full–Size Patterns**

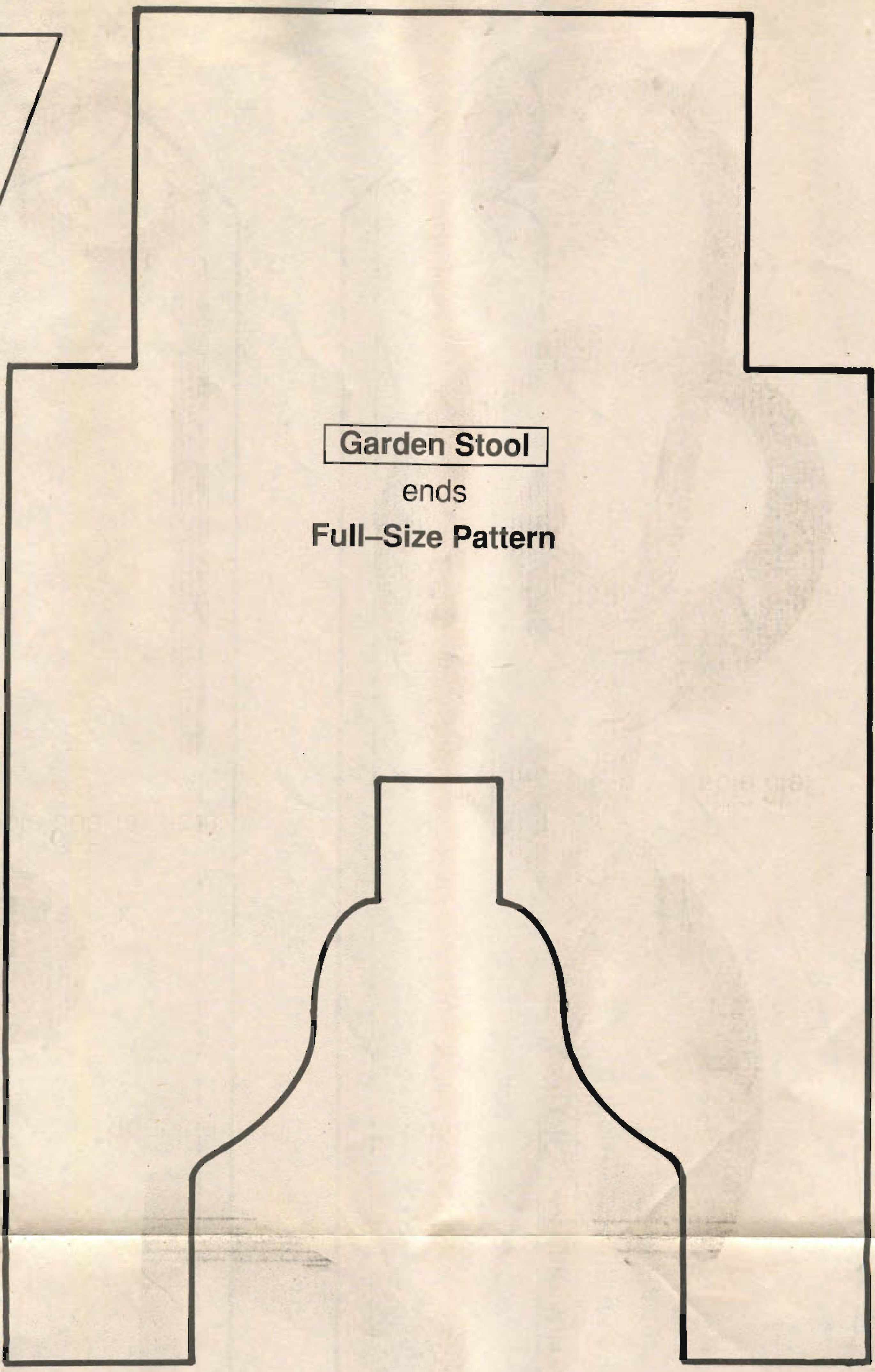
reble quarter note

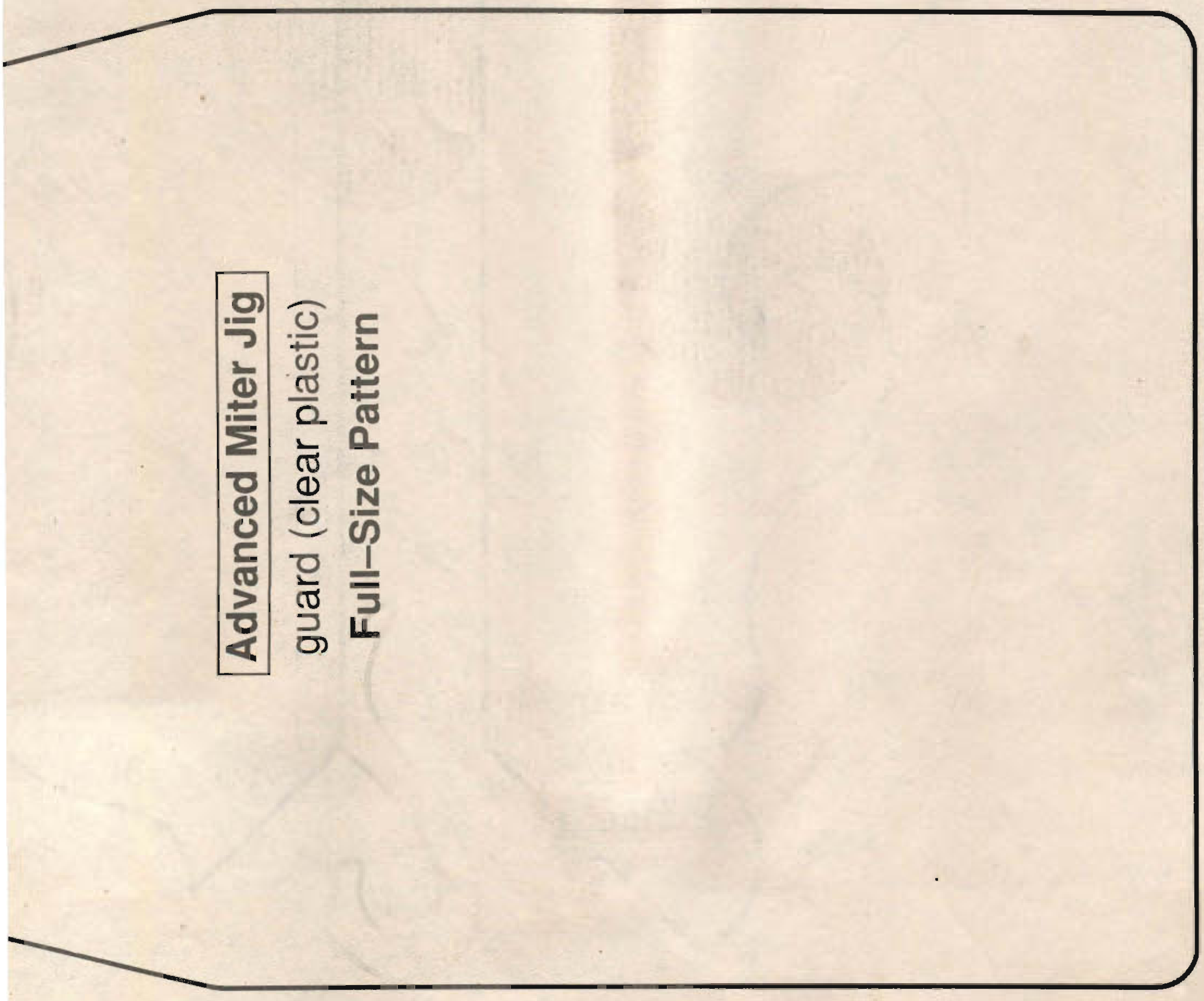


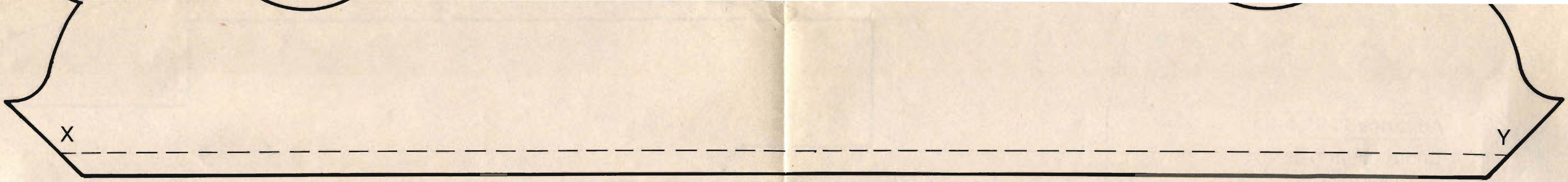
treble clef

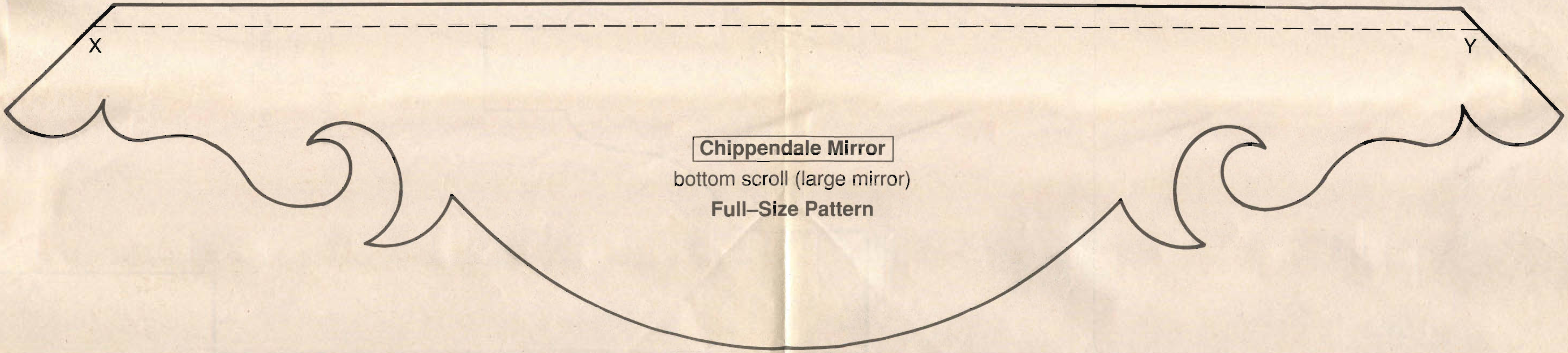


half note


Garden Stool
ends
Full–Size Pattern


Advanced Miter Jig
guard (clear plastic)
Full–Size Pattern

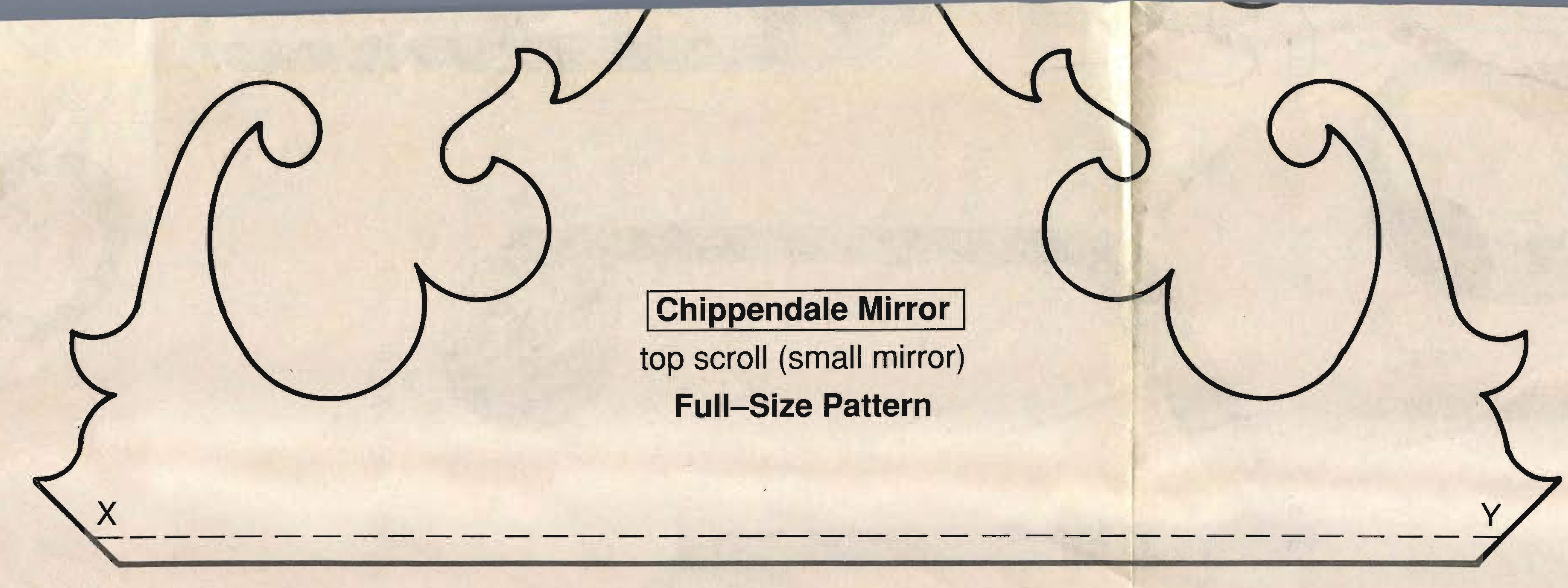




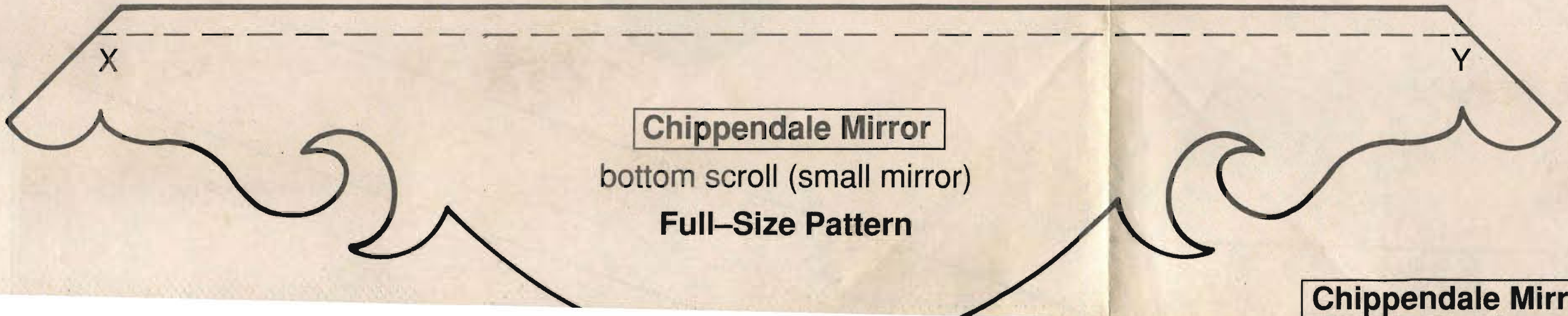
**Chippendale Mirror**

bottom scroll (large mirror)

**Full–Size Pattern**

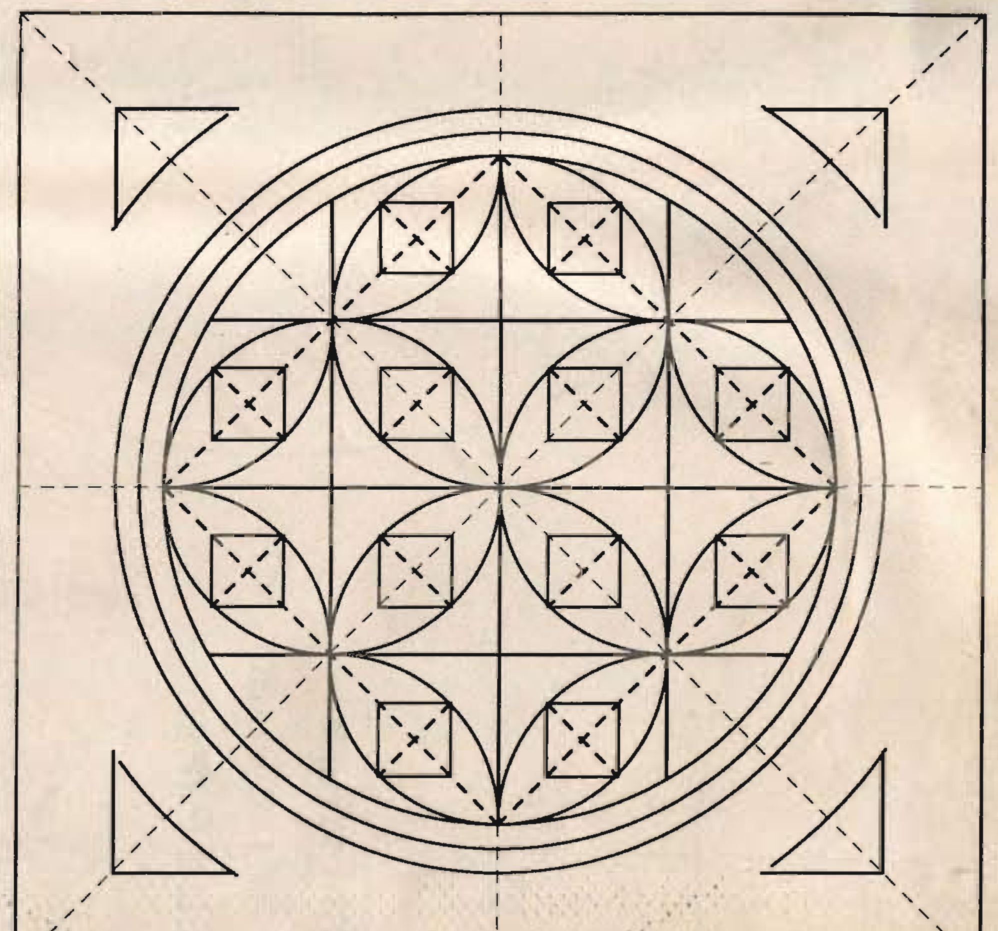


**Chippendale Mirror**
top scroll (small mirror)
**Full–Size Pattern**

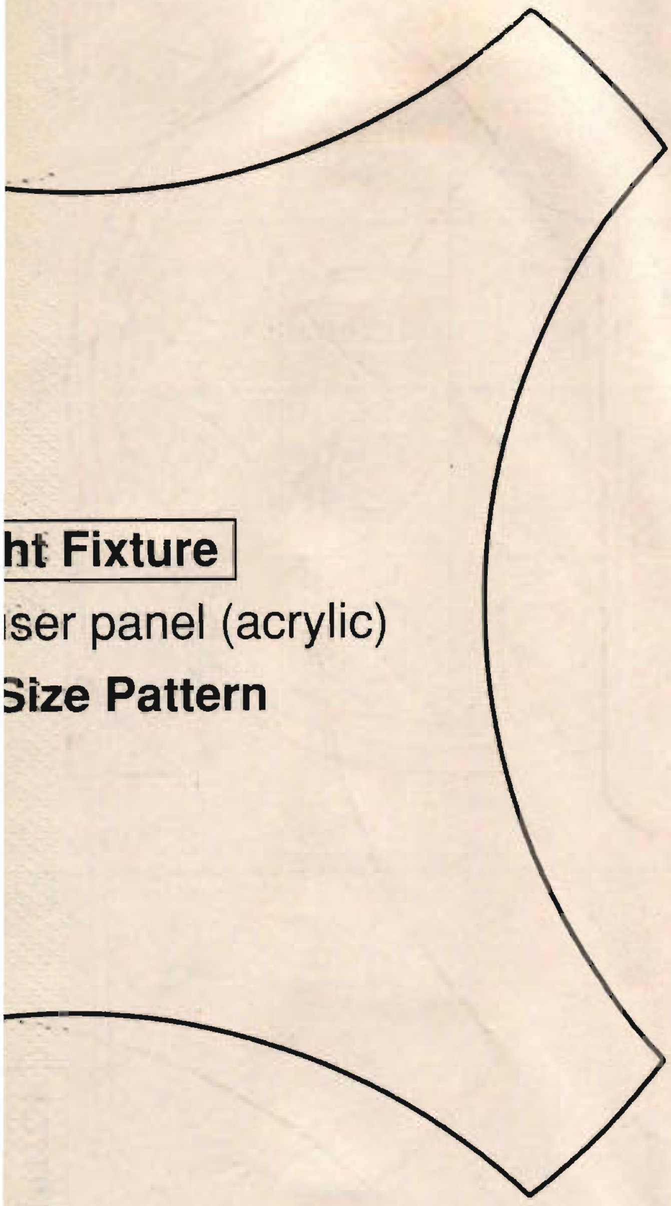


**Chippendale Mirror**
bottom scroll (small mirror)
**Full–Size Pattern**

Carefully open staples to remove plans, then bend them closed again.



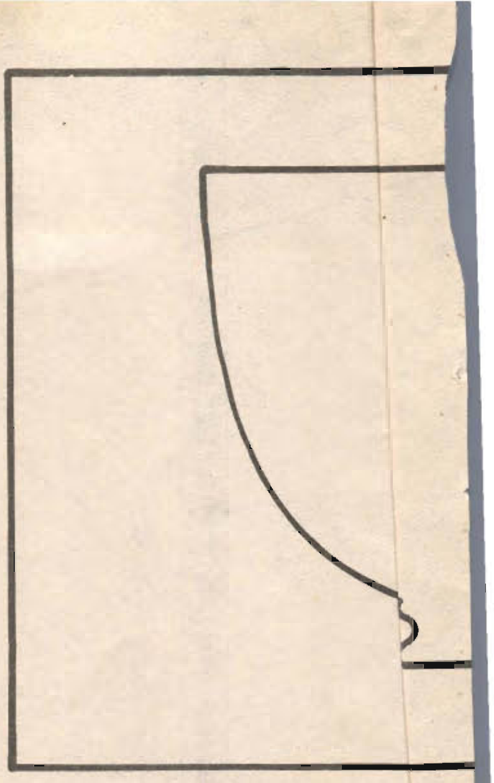
**Chippendale Mirror**



**ht Fixture**

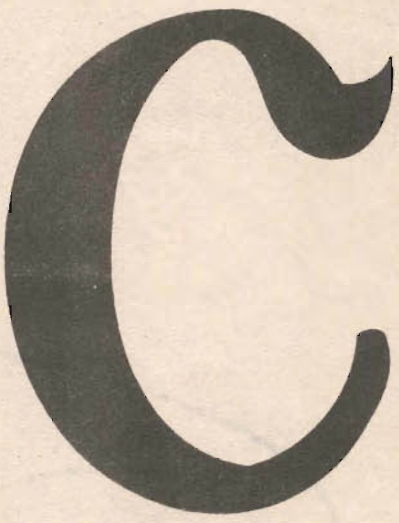
iser panel (acrylic)

**Size Pattern**

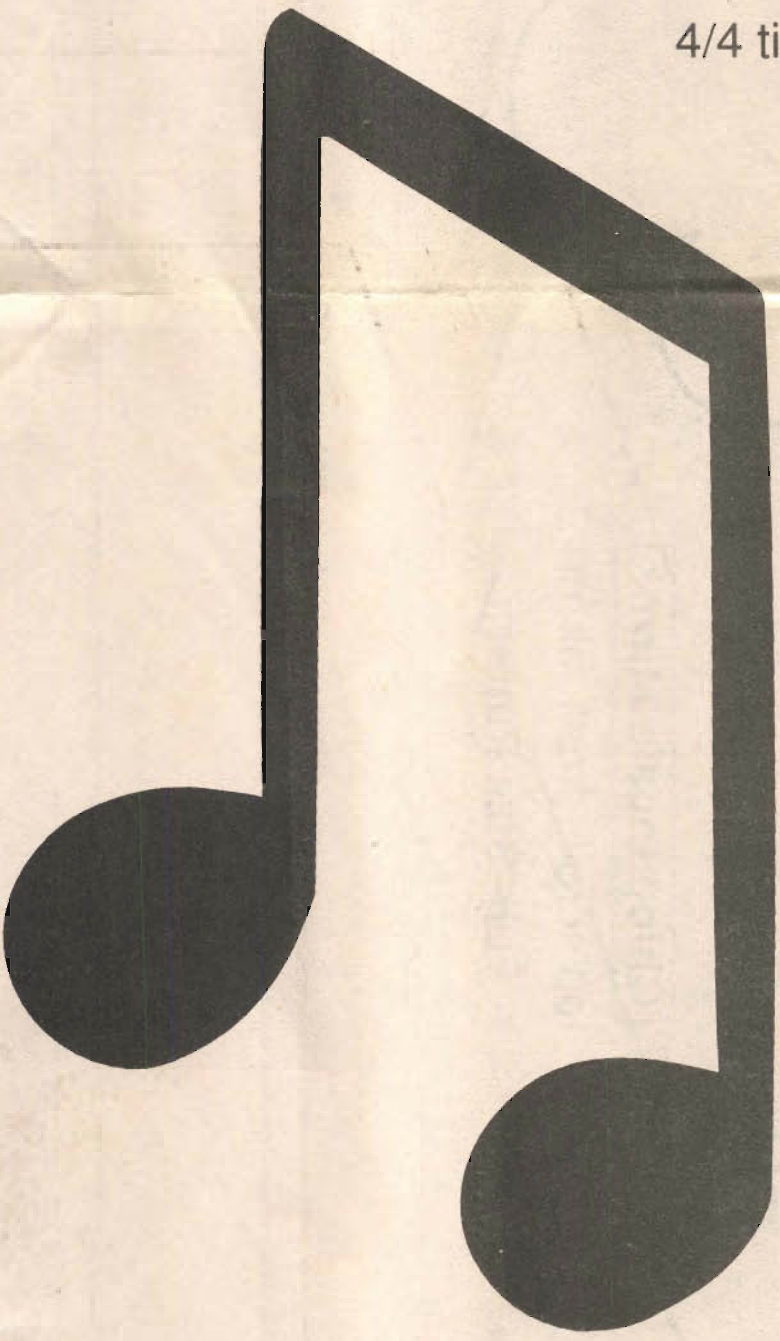


**Teacup**

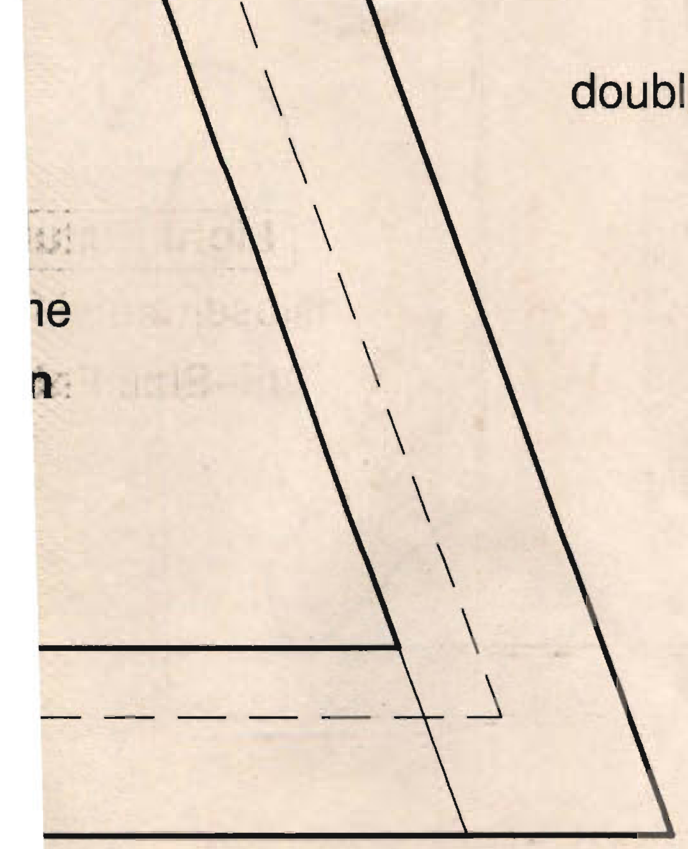
**Full–Size Turning Templ**



4/4 time signature



doubled bass eighth note



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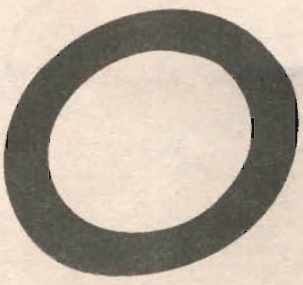
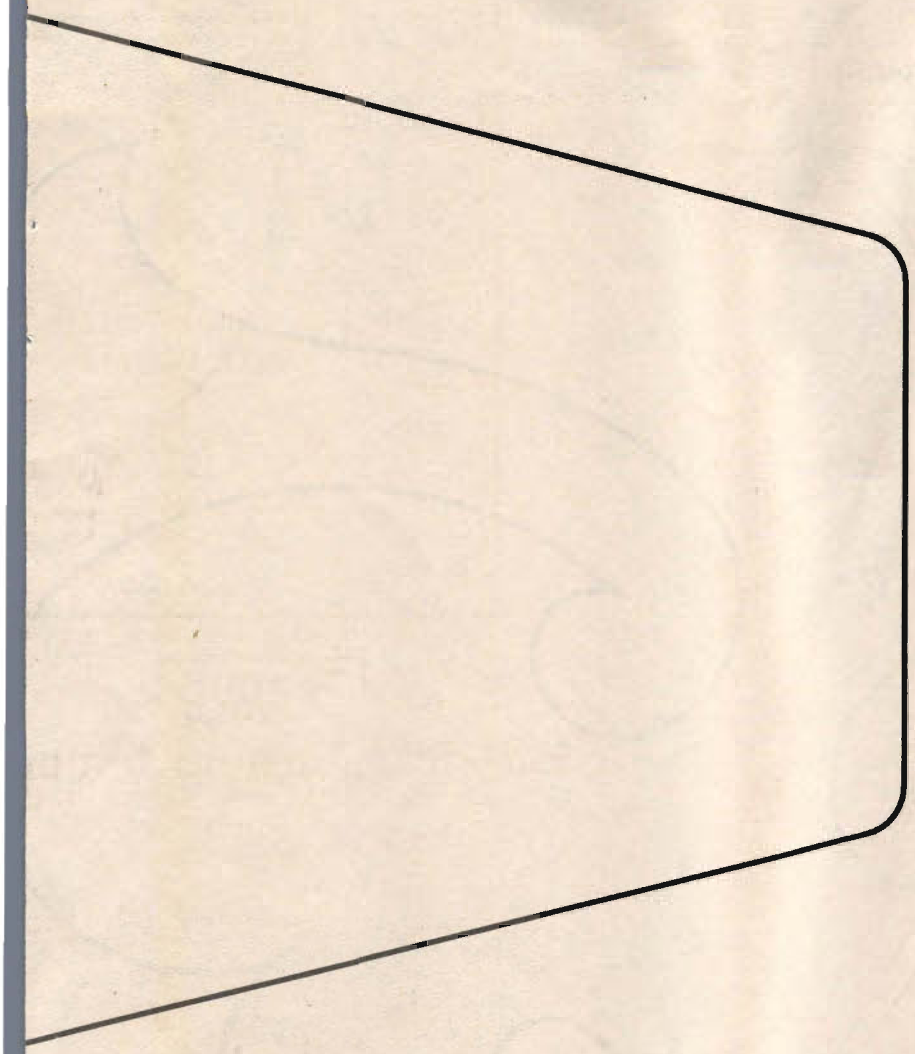
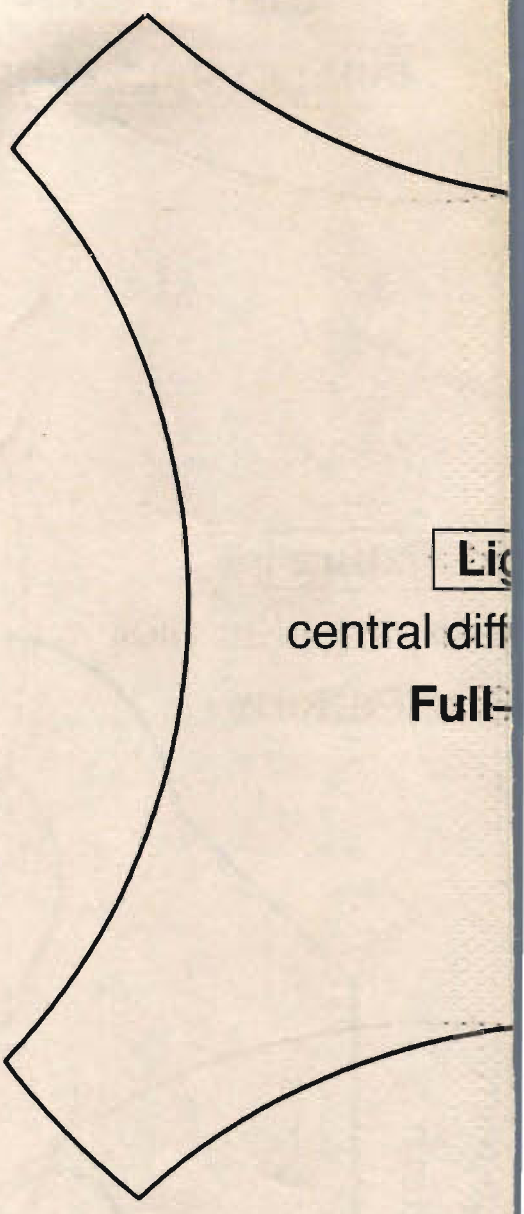


whole note

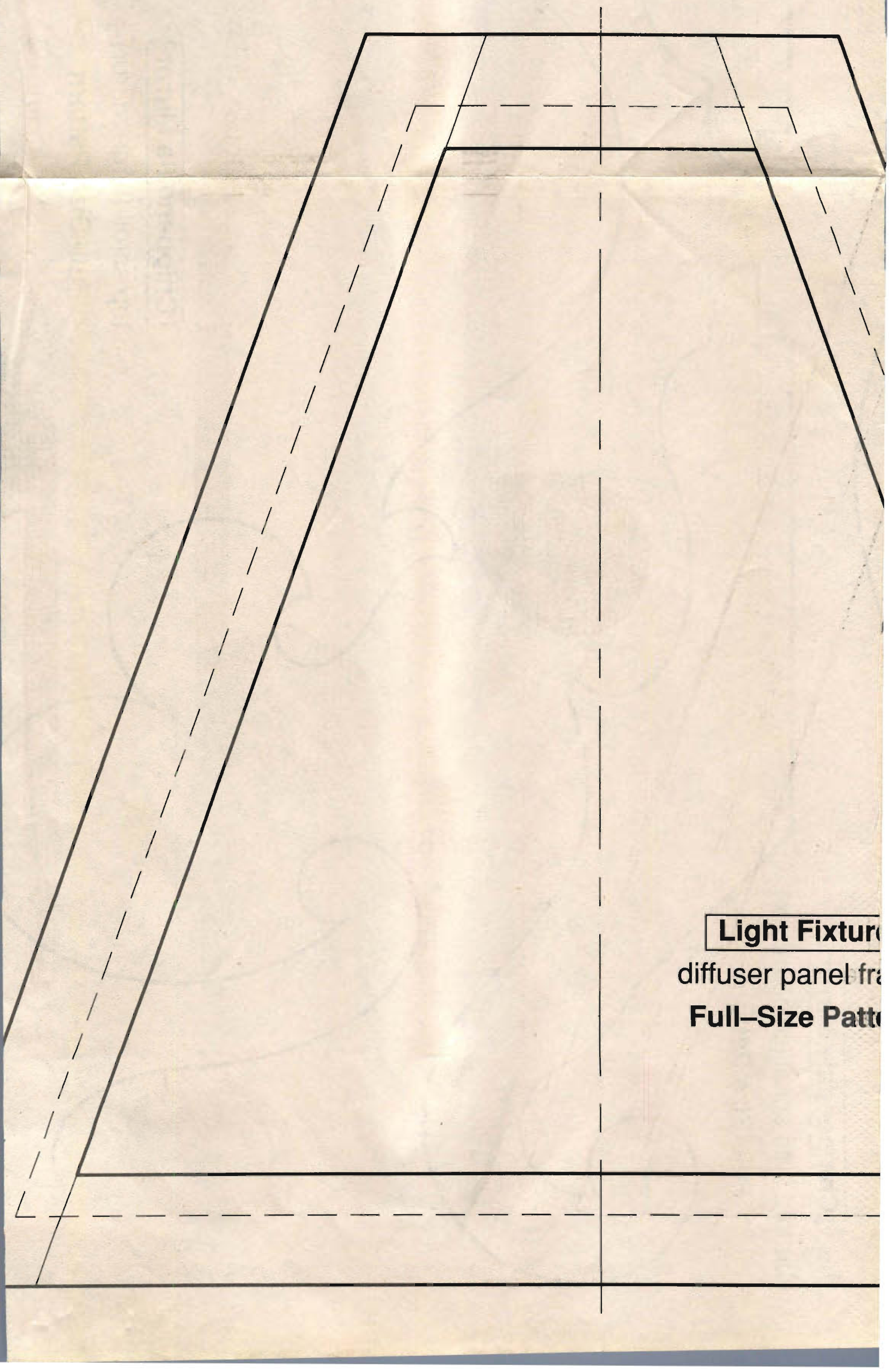




**Lig**

central diff

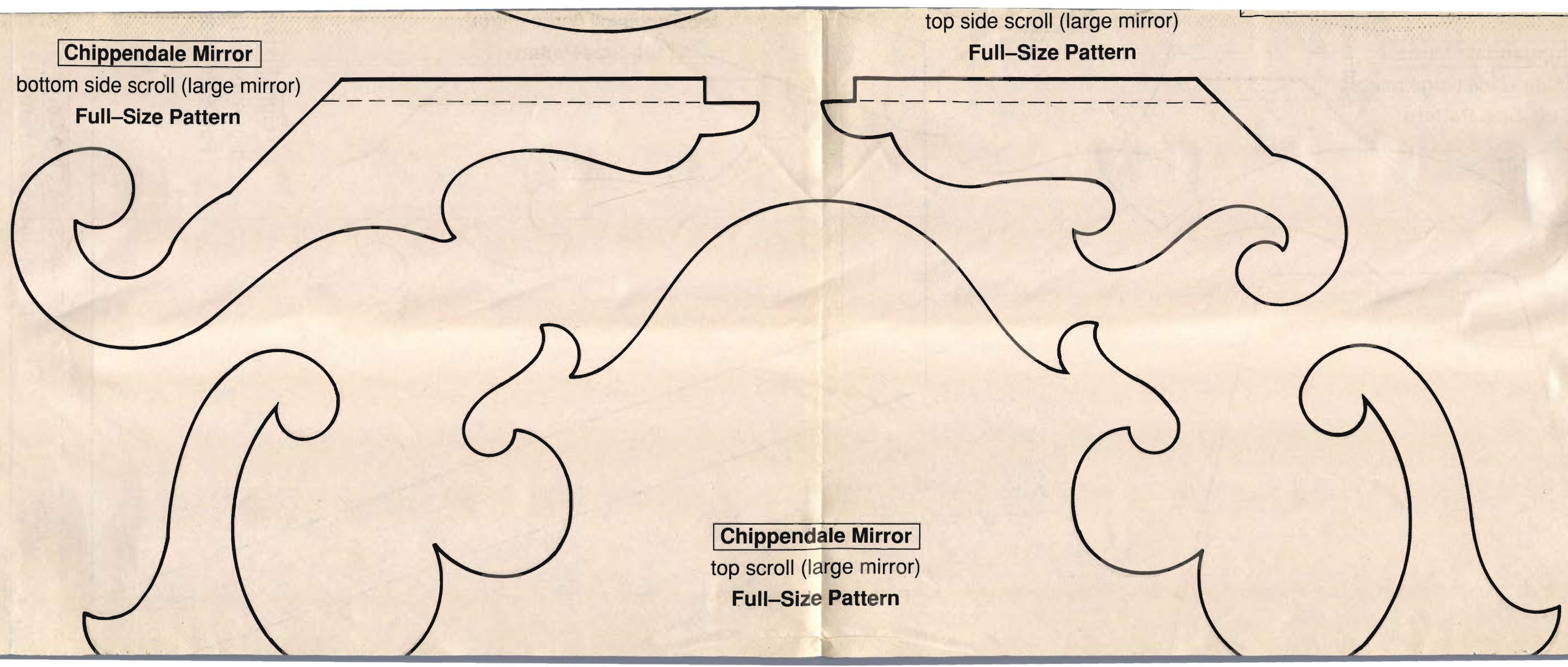
**Full-**



**Light Fixtur**

diffuser panel fra

**Full–Size Patt**



**Chippendale Mirror**

bottom side scroll (large mirror)

**Full–Size Pattern**

top side scroll (large mirror)

**Full–Size Pattern**

**Chippendale Mirror**

top scroll (large mirror)

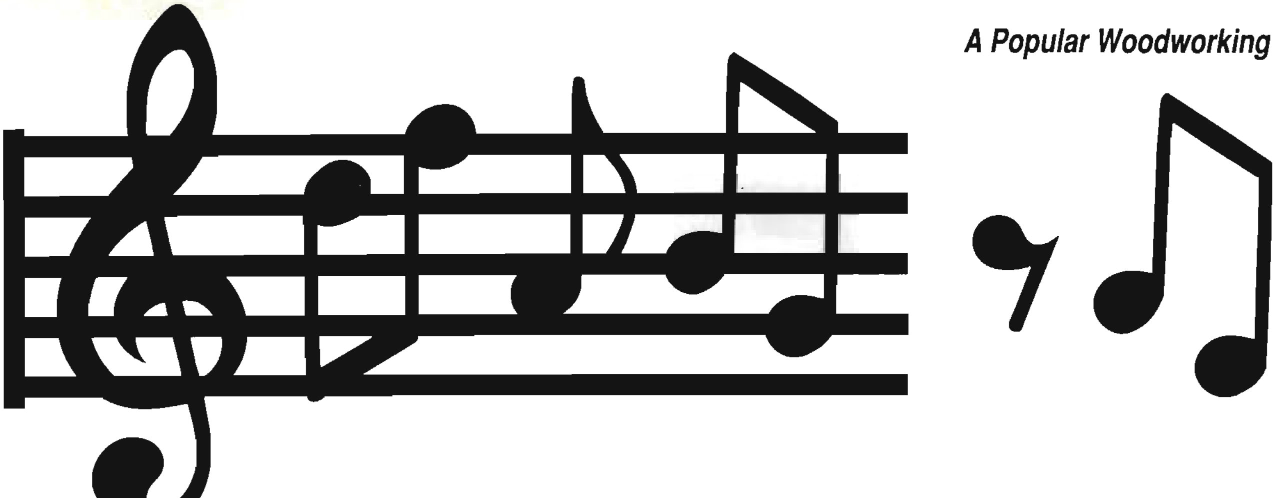
**Full–Size Pattern**

**Swiss Style Chip Carving**

**Full–Size Pattern**

Gothic design

*A Popular Woodworking Project*



# Musical Wall Decor

### by Howard French

This unique and easy–to–make wall decoration will add a musical note to any *room. First decide* how long you want the staff to be. If you want it fairly short, make it 18", which is half the length of the 36" dowels needed for the five staff lines. If you'd like to include more notes and perhaps a time signature, try the full 36".

Cut the staff bar from ¾" X ¾" scrap. Drill the five 5/16" diameter holes as shown in the Figure and sand the piece smooth. You'll find it helpful to make an extra piece to help align the staff later. If you're planning to make a staff longer than 18" or 20", make a third piece and turn it into a jig by drilling the holes all the way through, then sawing the piece exactly down the middle, through the holes. Cut the five lines from 5/16" diameter dowel rod stock, and sand a light 45° chamfer on one end of each.

If you make a pair of decorations (two separate staves), you might begin the top one with a treble clef and the one beneath with a bass clef. Or you might arrange extra clefs and notes on the wall nearby as well. Full–size patterns for clefs and notes are in the PullOut™ Plans. Cut templates from ⅛" hardboard (Masonite) or cardboard if you plan to make multiple pieces.

Cut the notes and clefs from ¼" hardboard. The PullOut™ Plans include a whole note, quarter note, eighth note, doubled notes, rests and a time signature. Since grain is not a factor here, you can cut quite a few from little material. Sand all edges smooth.

The tail of the treble clef will need reinforcing. Use a 5" length of coathanger wire bent to the shape and attached to the back surface of the clef with hot glue.

When all the parts are ready, put a drop of glue into each of the five holes in the bar and insert the chamfered ends of the five dowels. Here's where the extra bar, drilled identically, comes in handy to temporarily hold the free ends of the dowels parallel.

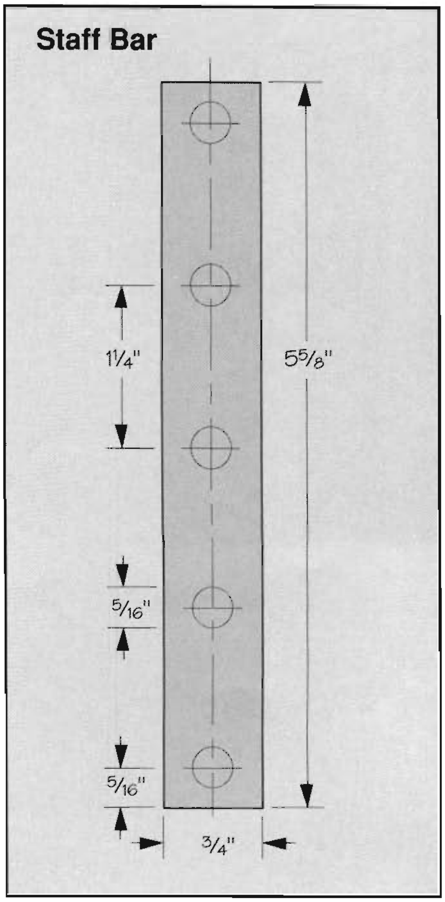
Locate the treble clef on the lines as shown. Cut a small notch into the E (bottom) line to accommodate the wire stiffener on the back of the clef. Lightly clamp the clef and notes where you want them with clothespins.

Now lay the assembly on its face and place a drop of hot glue at the intersection of each staff line and the symbols it supports. Make sure you remove any stray hot glue "threads" which can be hard to see—until after you've painted the surface. Leave on the extra bar at the end of the staff for alignment until the glue has cooled.

If you're making a fairly long staff, you may find that your dowels are warped enough to spoil the appearance of the decoration. Avoid the problem by using the jig described earlier. As you work across the staff attaching the symbols, clamp the five lines temporarily with the two halves of the jig. Leave the extra bar on the right end during the procedure, and move the jig along as you glue on the notes. Be sure the glue is cool and dry on one piece before you slide the jig to the right and attach the next. Each added note will help to hold the staff lines parallel.

Determine the center of gravity of the assembly and install a small screw eye into the back of the F (top) line to hang it. Hang individual notes and clefs by bending a "joggle" or hook in a small paper clip and hot gluing it to the back of the piece. Paint everything flat black. PW

**Staff Bar**



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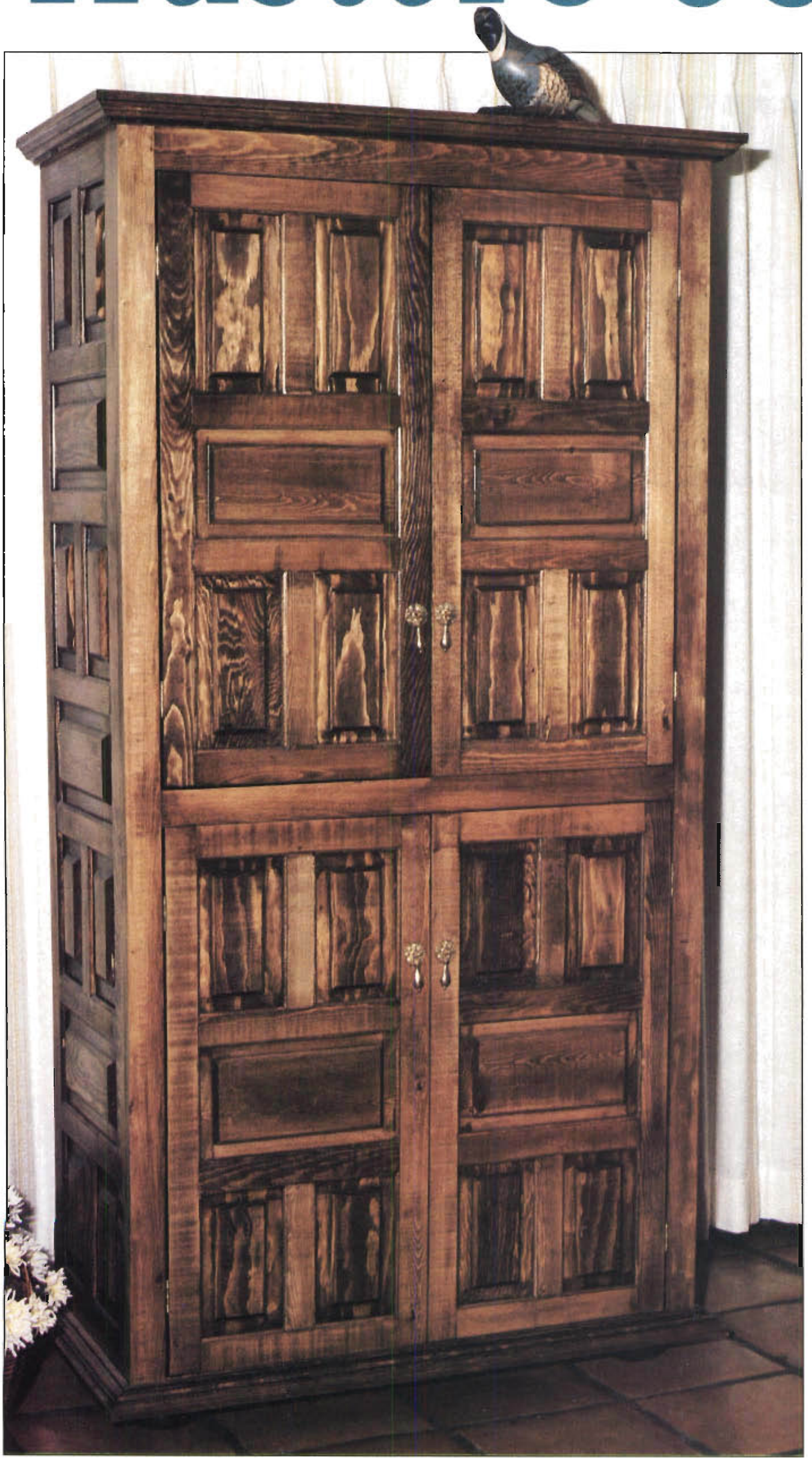
***Howard V. French** lives in Abilene, Texas, where he spends his time dreaming up woodworking project ideas.*

A Popular Woodworking Project

# Trastero Construc



### by Hugh Williamson

The word *trasto* is Spanish for utensil or implement; in the kitchen a *trastero* is a freestanding cupboard. The kitchen and dining rooms of a Spanish colonial house were not complete without a trastero, but now this type of piece is also found in other rooms—as a wardrobe in a bedroom or an entertainment center in the family room.

The nature of its construction—with many small panels contained in an elaborate frame structure—as well as the choice of materials (usually pine) reflect the difficulty Mexican craftsmen have in getting good wood. The frame and panel design allows them to use small pieces to form large attractive panels. Most of the early trasteros were built with *mortise and tenon* joints that were pegged for strength and decoration. The upper doors often had openings with square or turned spindles to allow ventilation.

This project is a lot of fun to make, and on the following pages I'll explain how you can make your own trastero and a Spanish–flavored bookcase to go with it. If you want to try mortise and tenon joinery, refer to *PW* #30 for several articles on the subject. Here, I'll discuss how to make these projects using a router table with a rail and stile router bit set like those available from the suppliers listed in the box on page 62.

## Making the Frame Members

Let's start with the trastero. There are a lot of repetitious cuts involved in making the panels and the frame members, so use a stop block to make certain they all come out the same size. The best approach is to cut wide material for the rails (A and B) and mullions (C) to the finished lengths given in the Cutting List, but *don't* rip them to width just yet. It's better to do the end-routing with the rail bit while the boards are wide; it's faster than routing them individually. You have more control and you can elimi-

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***Hugh Williamson** is a retired Doctor who makes furniture for his family in Tucson, Arizona.*

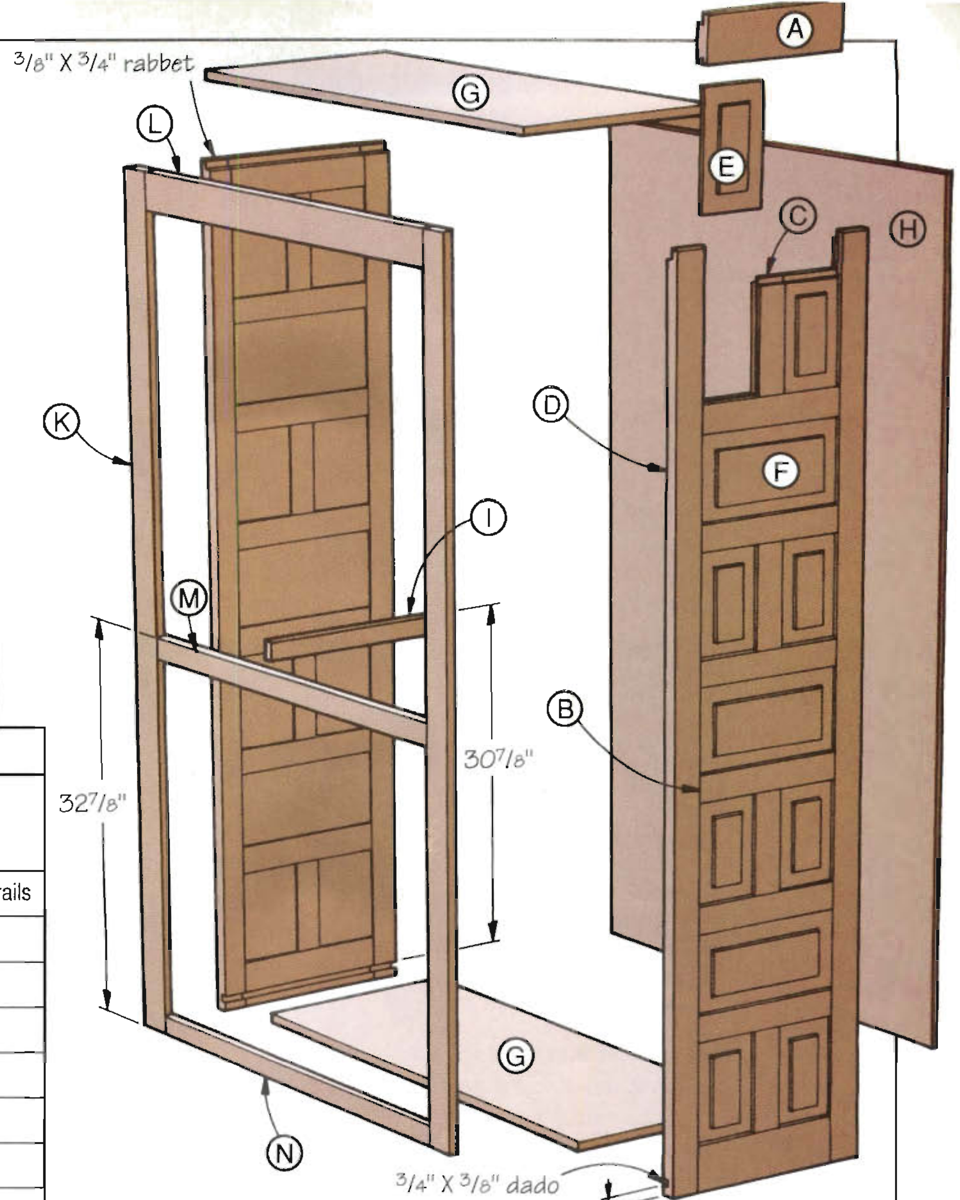
# tion

nate the splintered edge created when the bit exits the cut. Always cut a few extra parts so you can discard any with blemishes or bad cuts. Once the routing is done, you can rip the pieces to their finished widths.

While you're set up to rip the 2" rails, rip all the stile material too. Cut the stiles (D) several inches longer than their finished length; you won't trim these to size until after assembling the sides. Now chuck the stile bit in the router, and make test cuts in

**Trastero Cutting List**

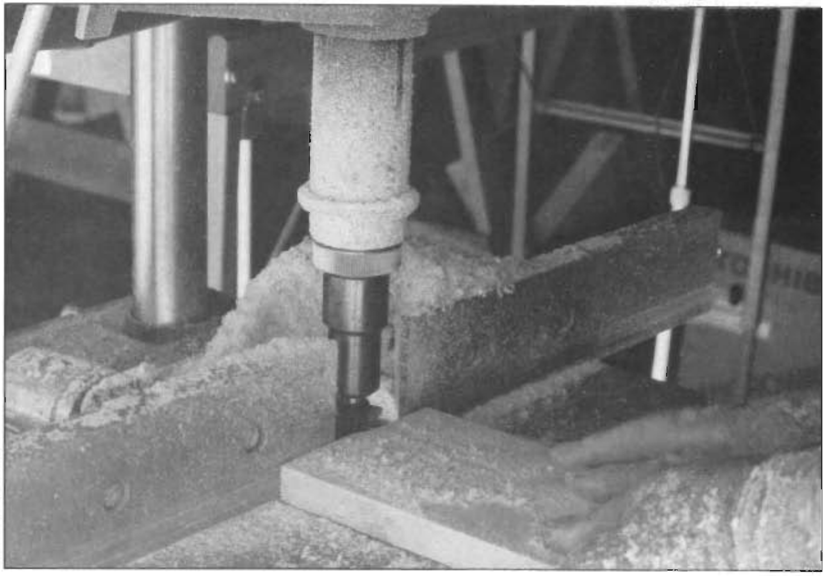
| Qty | Part | Finished Size T | W | L | Piece |
|---|---|---|---|---|---|
| 4 | A | 3/4" | 4" | 12 3/4" | top & bottom case rails |
| 12 | B | 3/4" | 2" | 12 3/4" | case rails |
| 8 | C | 3/4" | 2" | 9 1/4" | case mullions |
| 4 | D | 3/4" | 2" | 72" | case stiles |
| 16 | E | 3/4" | 5 3/4" | 9 1/8" | small panels |
| 6 | F | 3/4" | 6 3/4" | 12 5/8" | large panels |
| 2 | G | 3/4" | 16" | 35 1/4" | top & bottom |
| 1 | H | 3/8" | 35 1/4" | 70 1/2" | back |
| 8 | I | 3/4" | 1 1/2" | 15 5/8" | shelf supports |
| 4 | J | 3/4" | 15 5/8" | 34 1/2" | shelves |
| 2 | K | 3/4" | 2" | 72" | faceframe stiles |
| 1 | L | 3/4" | 3 3/4" | 32" | top frame rail |
| 1 | M | 3/4" | 2" | 32" | center frame rail |
| 1 | N | 3/4" | 1 1/2" | 32" | bottom frame rail |
| 16 | O | 3/4" | 2" | 12 7/16" | door rails |
| 4 | P | 3/4" | 2" | 33" | top door stiles |
| 4 | Q | 3/4" | 2" | 31 1/2" | bottom door stiles |
| 4 | R | 3/4" | 2" | 10 1/4" | top door mullions |
| 4 | S | 3/4" | 2" | 9 5/16" | bottom door mullions |
| 2 | T | 3/4" | 6 3/8" | 12 1/4" | top door panels |
| 8 | U | 3/4" | 5 1/4" | 10 1/8" | top door panels |
| 2 | V | 3/4" | 7" | 12 1/4" | bottom door panels |
| 8 | W | 3/4" | 5 1/4" | 9 1/8" | bottom door panels |



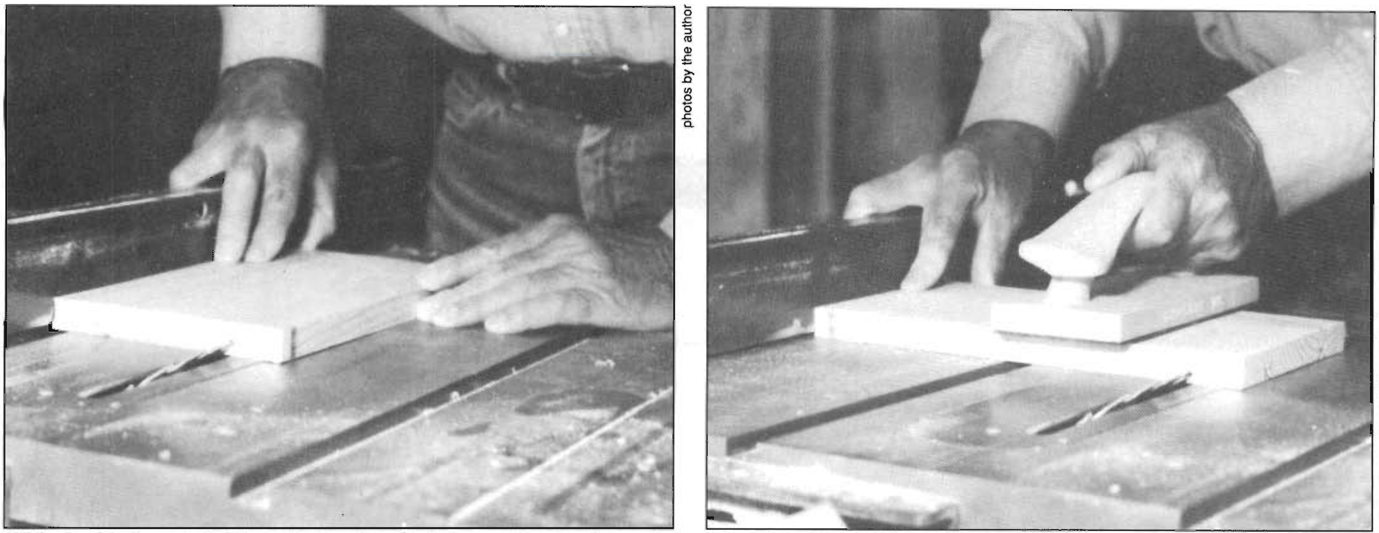
Tom Larson

Figure 1. Trastero Assembly

*With the rail (or coping) bit chucked in my Shopsmith®, I rout the ends of the rail material before ripping it to width.*

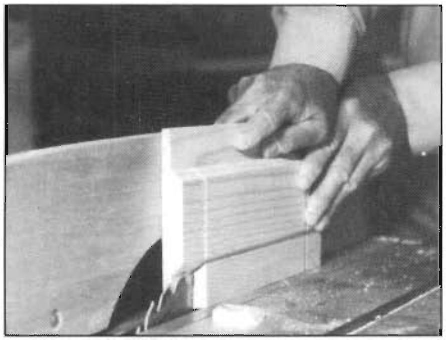


photos by the author



photos by the author

***With the blade set at 45° and raised to 5/16", I position the fence to cut the shoulders of the raised area.***
***If your blade tilts toward the fence, you won't have to move it to make this cut on the ends or on panels of a different size.***



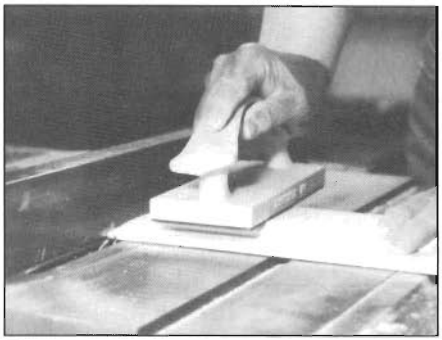
***Attach a high auxiliary fence to support the panels as you remove the waste.***

some scrap to check the fit with the end cuts you just routed. Mill the grooves on one edge of each stile and the top and bottom rails (A) and on *both* edges of the remaining rails and mullions (see Figure 1). Dry assemble the frame at this point to make sure it all goes together right.

## Making the Panels

The raised panels can be cut on a shaper, or with a router and a panel-raising bit, or on a table saw—the way I do them. I tilt the saw blade to 45°, raise

it to a height of 5/16" and set the fence to define the shoulders of the raised area (see Figure 2). If the blade on your table saw tilts *toward* the fence, you can set it at 1 1/4" from the outside of the blade and make all four cuts with this setting. My blade tilts away from the fence, so I

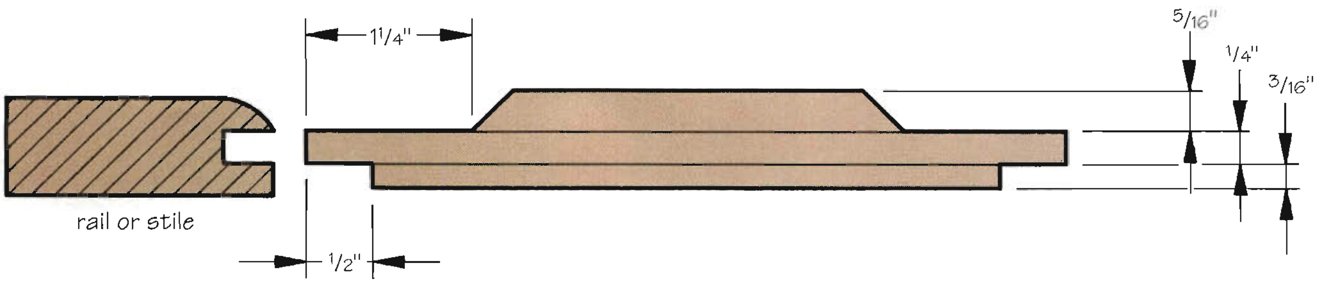


***The last step in making the panels is to rabbet all four edges of the back.***

have to set it at one position for the rip cuts, and a different position for the cross grain cuts.

After you've made all the shoulder cuts, straighten the blade, and raise it to 1 1/4". Attach a high auxiliary fence and set it at 5/16" from the *outside* of the blade; then make the cuts to remove the waste around the raised field. The last step in making the panels is to cut a 3/16" deep, 1/2" wide rabbet around the perimeter of the backside. Sand the panels smooth, and apply your finish before assembly.

**Figure 2. Cross–Section Through Panel and Frame**



Tom Larson

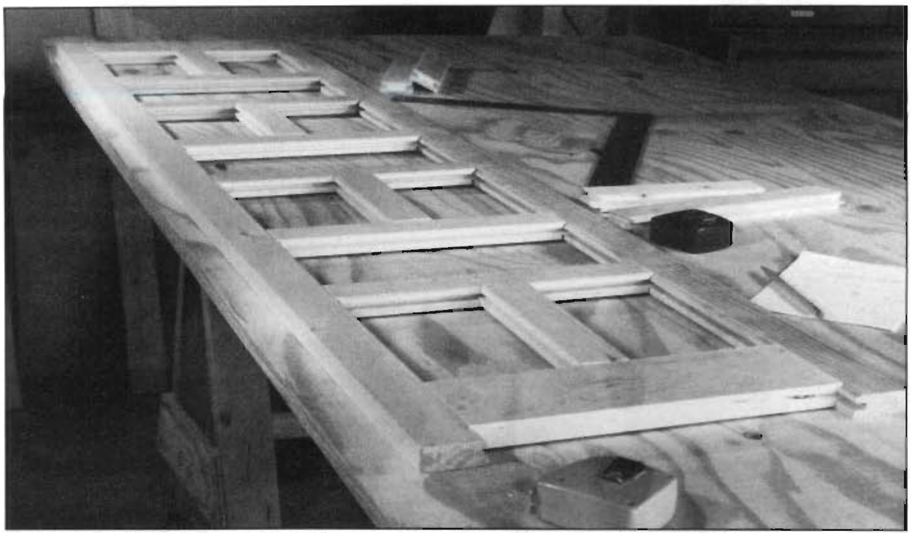
## Assembling the Case

The raised panels must be allowed to "float" within the frames to accommodate wood movement. Glue only the frame members. I set up on a large sheet of plywood by tacking a strip of wood across one end and another long strip perpendicular to that to sort of cradle the assembly. Spread glue on the coped ends of one of the wide rails (A), position it between the two stiles and apply a clamp (insert the other wide rail at the other end without glue to set the proper spacing). Clean away any glue that may have seeped into the panel groove, and insert one of the small panels (F). Spread some glue on the coped ends of a mullion (C), fit it in place and insert another small panel.

Glue the next rail (B) in place by tipping it into position; clean off any glue from the panel grooves, square the rail to the stile and apply another clamp. Now install a large panel (F) and another rail, and proceed in this fashion until the whole side assembly is put together.

When these assemblies are dry, trim the stiles to finished length, stain the inside surfaces and rout the dadoes and rabbets for the top and bottom (G) and back (H) as shown in Figure 1. Cut those pieces to size, and rabbet the back edges of the top and bottom as well.

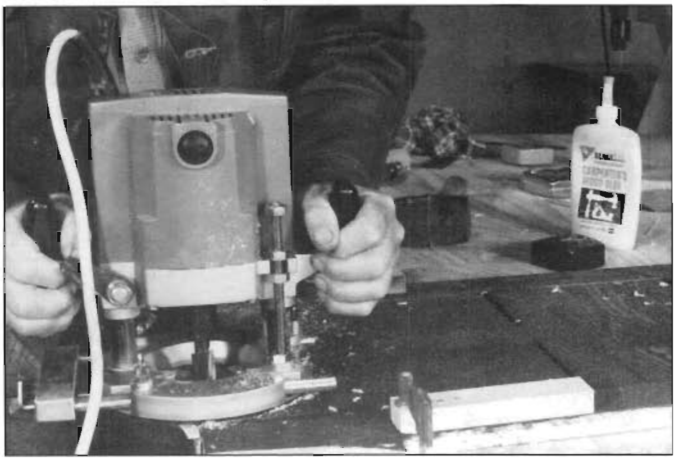
The next step is to attach the shelf supports (I) to the sides. I lay the two assemblies side by side on the workbench and fit a block of wood into the bottom dado to keep them aligned. Then, with a framing square, I position the shelf supports and glue and screw them to just the stiles. One pair of shelf supports must be positioned at 30$^7/_8$" from the bottom dado so the upper and lower case will be properly defined



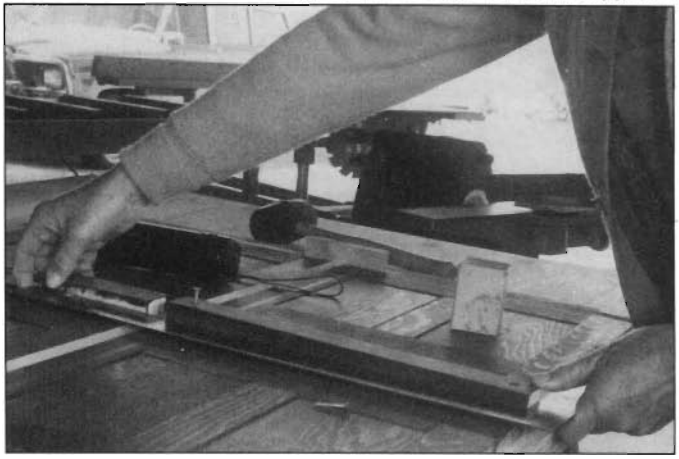
***Dry–assemble the frame to make sure everything fits right. I leave the stiles long until after assembly.***

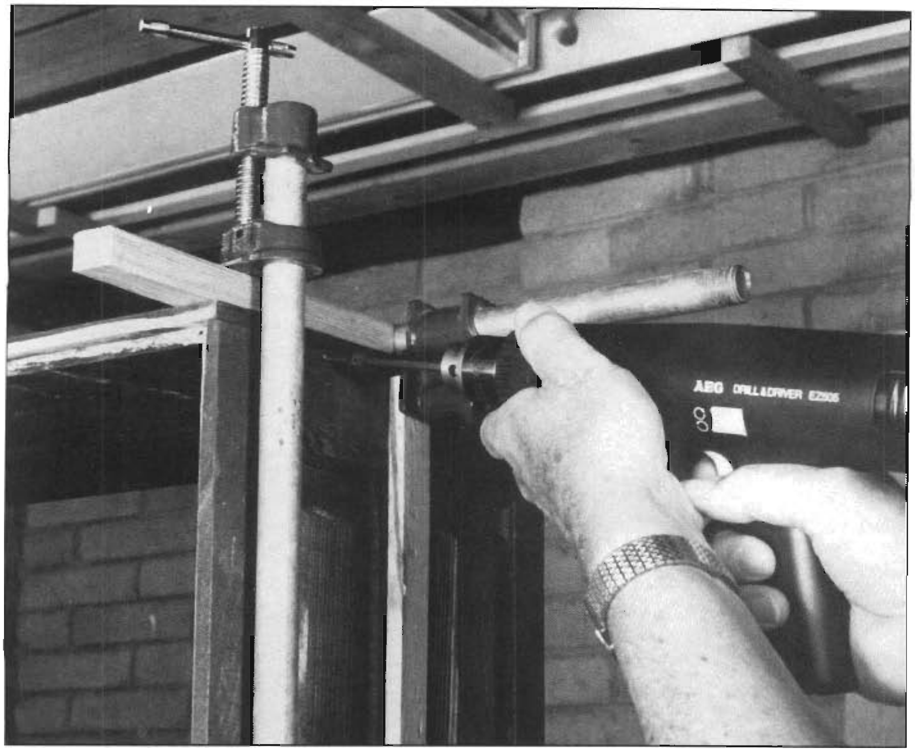
***Check that the rails are square as you assemble the sides.***

***After assembling the sides, rout the dadoes for the bottom and the rabbets for the top.***



***Fit a block inthe bottom dado, and use a framing square to align the shelf supports.***





***Use clamps to apply pressure to the case as you glue and screw the top to the sides.***

***I made a template from an old file folder to mark the blank for turning the feet. See the PullOut™ Plans for a full-size pattern.***

(see Figure 1). The other shelf supports can be located wherever you like.

Cut the shelves (J) to size according to the Cutting List; the dimensions given are for the finished size, including whatever edging you want to apply. Stain all the parts before assembly. Use glue and screws to assemble the case; they'll be covered by the moulding at the top and bottom. Screw the shelves to their supports as well. Install the back to keep the case square. You can also drive some screws through the back and into the shelves for more support.

## The Face Frame and the Feet

Though the dimensions are given in the Cutting List, it's better to cut the face frame members to fit the assembled case. Rip them to the indicated widths first; then cut the stiles (K) to length. Cut the rails (L, M and N) to the length that will fit between them. Use dowels to assemble the face frame, drilling the holes with a doweling jig and matching the holes with dowel centers. Glue the frame together; then glue and nail it to the case.

The feet on my trastero are four simple spheres that I turn on the lathe. I glue up blanks by stacking eighteen 4 1/2" X 4 1/2" blocks of 3/4" material and turn all four simultaneously. There's a full-size template for this turning in the PullOut™ Plans section of this issue. When you cut the four pieces apart, make sure they're all the same thickness; you may need to touch them up on a disk sander. You want a 2" diameter flat surface on both ends.

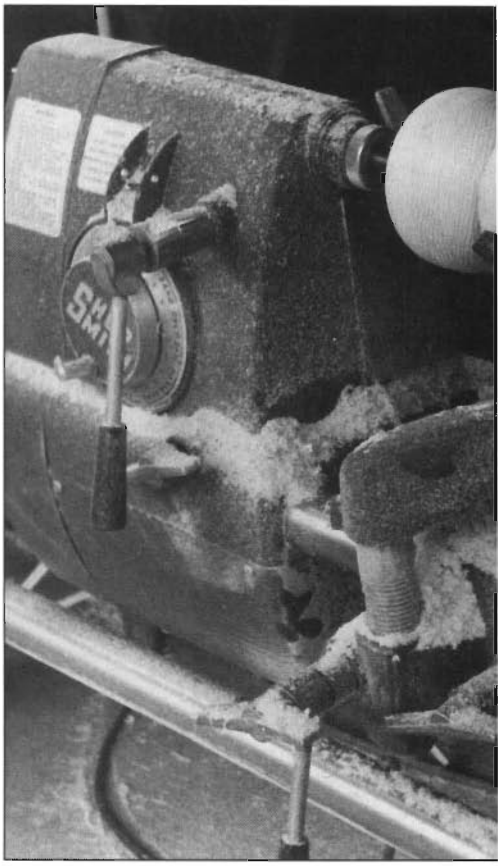
The feet are attached to the cabinet bottom with 1/4" X 3 1/2" carriage bolts. Counterbore the bottoms of the feet to accept the washer and the nut; then drill through with a 1/4" bit for the bolt.

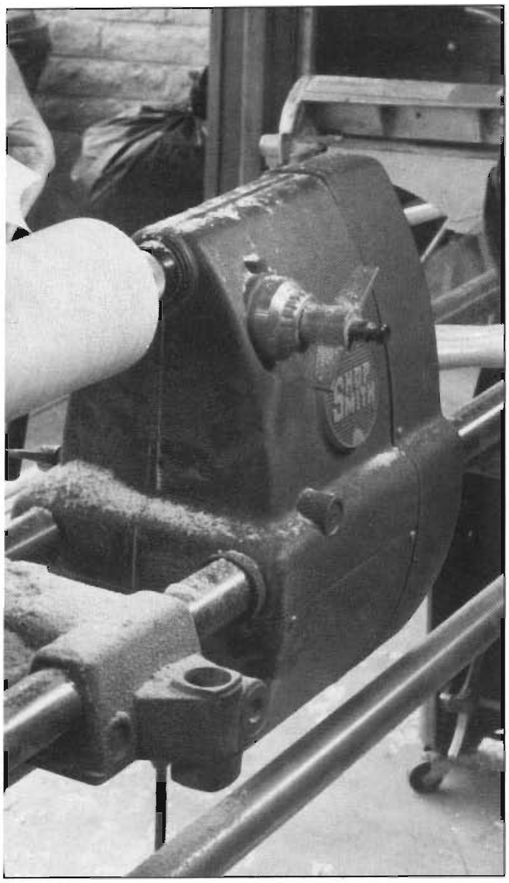
Buy some stock moulding from your lumberyard or make your own from 1 1/2" X 1 1/2" stock. Miter the corners, and attach it at the top and bottom on three sides of the cabinet, covering the screws used during assembly.

## Making the Doors

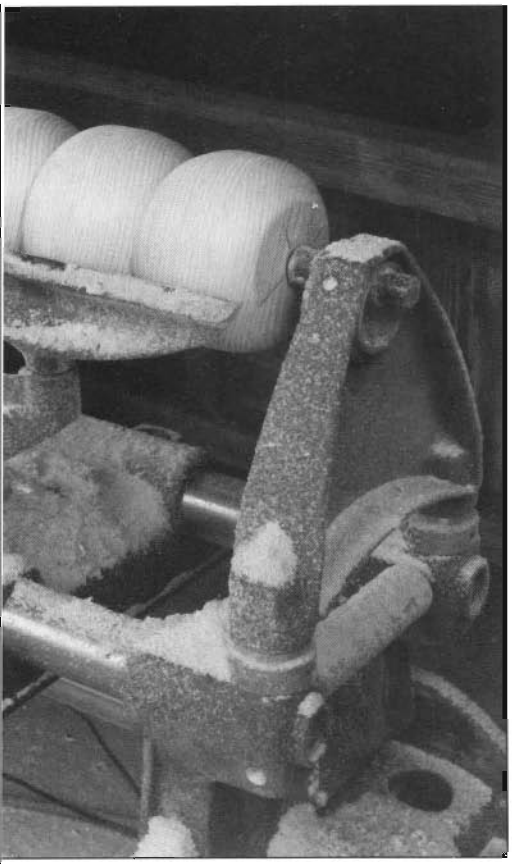
Before you start cutting the parts for the doors, check the sizes of the openings on your cabinet and make any necessary adjustments in the Cutting List. The doors should fit with at least a 1/16" gap all around to allow them to open and close easily. Figure 3 shows the arrangement of the panels; the procedure is virtually the same as for constructing the cabinet sides. Hang the doors with 1 1/2" X 1 1/4" butt hinges mortised into the stiles. I used some hanging pulls that have a Spanish colonial look to them and magnetic catches to keep the doors closed.

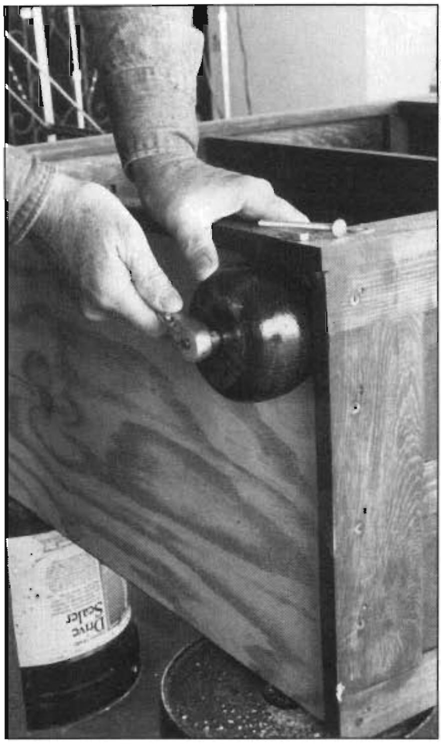
The trastero makes a great dry bar if you use Mexican clay tile on the middle shelf and modify the overhead shelves to





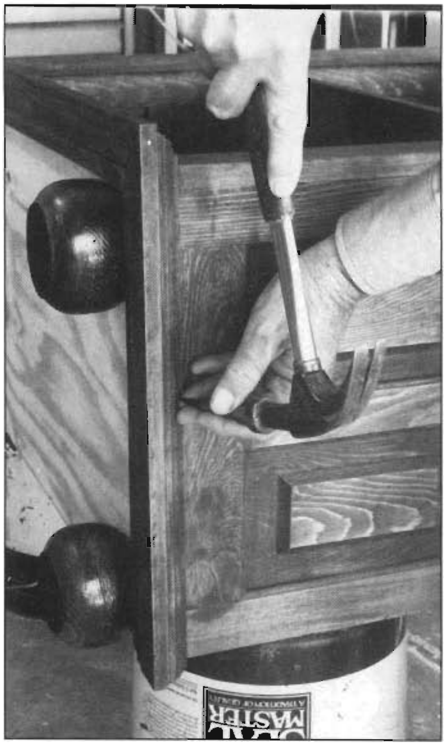
Turn all four feet at once; then cut them apart leaving a 2" flat on each end.





Counterbore the feet to accept the nut and washer of a 3½" carriage bolt.

photos by the author



Apply moulding to cover the screwheads at the top and bottom.

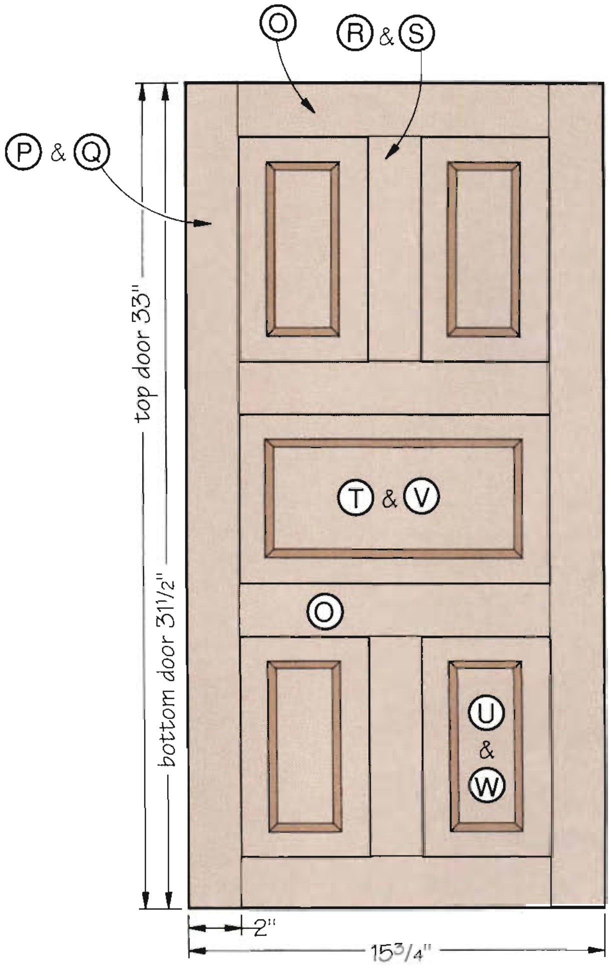


Figure 3. The Doors

Tom Larson

give adequate counter and storage space. You could also make cutouts for bar glasses in the modified shelves.

## A Spanish-Flavored Bookcase

Figure 4 shows the design of the bookcase featured in the photo below. You might want to try this project first, as a way to get started with this type of construction without committing so much time and wood. The process is the same except for the way the top (GG) attaches to the sides. Since it's so visible, instead of fitting down into a rabbet, the top has rabbeted ends that lap over the side assemblies. It's also wider than the bottom (HH) so it covers the top edge of the face frame. PW

Tom Larson

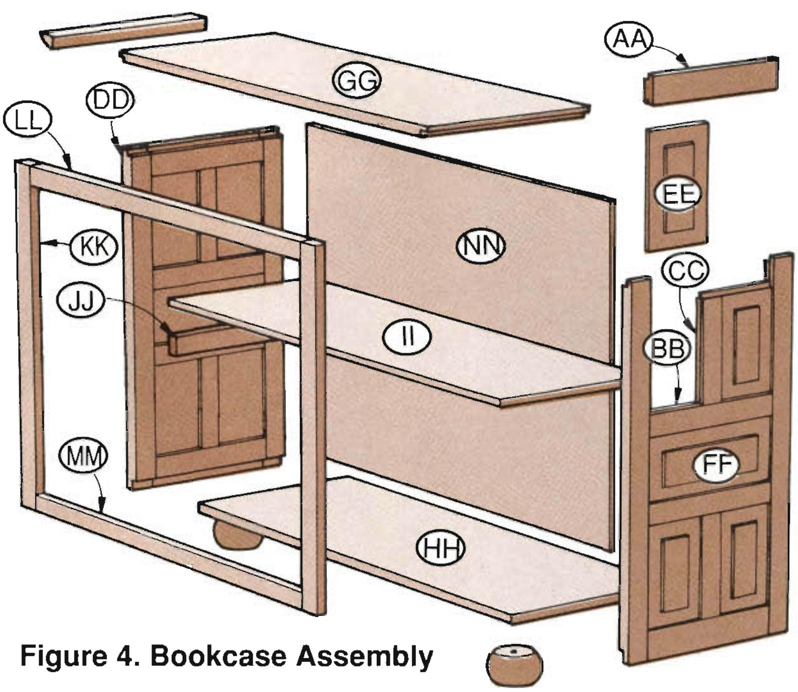


Figure 4. Bookcase Assembly

**Spanish Bookcase Cutting List**

| Qty | Part | Finished Size T | W | L | Piece |
|---|---|---|---|---|---|
| 4 | AA | 3/4" | 2 1/2" | 9 3/4" | top & bottom case rails |
| 4 | BB | 3/4" | 1 1/2" | 9 3/4" | case rails |
| 4 | CC | 3/4" | 1 1/2" | 9 1/4" | case mullions |
| 4 | DD | 3/4" | 1 1/2" | 30" | case stiles |
| 8 | EE | 3/4" | 4 1/4" | 9" | small panels |
| 2 | FF | 3/4" | 5 1/2" | 9 1/2" | large panels |
| 1 | GG | 3/4" | 12 3/4" | 36" | top |
| 1 | HH | 3/4" | 12" | 35 1/4" | bottom |
| 1 | II | 3/4" | 11 5/8" | 34 1/2" | shelf |
| 2 | JJ | 3/4" | 1 1/2" | 11 1/2" | shelf supports |
| 2 | KK | 3/4" | 1 1/2" | 30" | face frame stiles |
| 1 | LL | 3/4" | 1 1/2" | 33 1/8" | top frame rail |
| 1 | MM | 3/4" | 1 1/4" | 33 1/8" | bottom frame rail |
| 1 | NN | 3/8" | 29 1/8" | 35 1/4" | back |

### Rail & Stile Router Bit Sources

C & L International
1729 Analog, Dept. PW
Richardson, TX 75081
800-966-6543

The Fine Tool Shops
Box 7019, Dept. PW
Portsmouth, NH 03801

Cascade Tools, Inc.
Box 3110, Dept. PW
Bellingham, WA 98227
800-235-0272

Tool City
14136 East Firestone, Dept. PW
Santa Fe Springs, CA 90670
800-423-7899

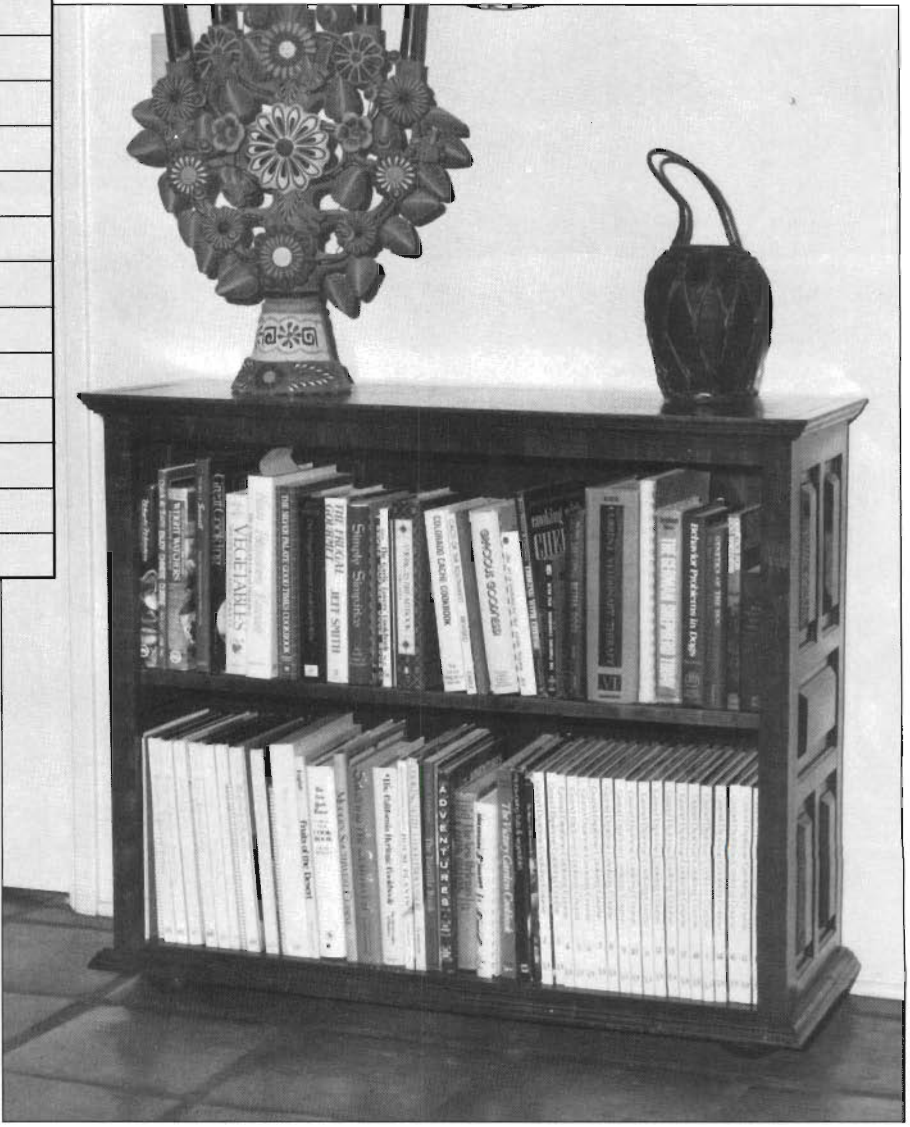
Constantine's
2050 Eastchester Rd., Dept. PW
Bronx, NY 10461
800-223-8087

Econ–Abrasives
Box P865021
Plano, TX 75086
800-367-4101

MLCS Ltd.
Box 4053PA
Rydal, PA 19046
800-5-33 9298

Trend–lines
Box 6447, Dept. PW61
Chelsea, MA 02150
800-343-3248

Woodworkers' Supply of New Mexico
5604 Alameda Place NE, Dept. PW
Albuquerque, NM 87113
800-645-9292



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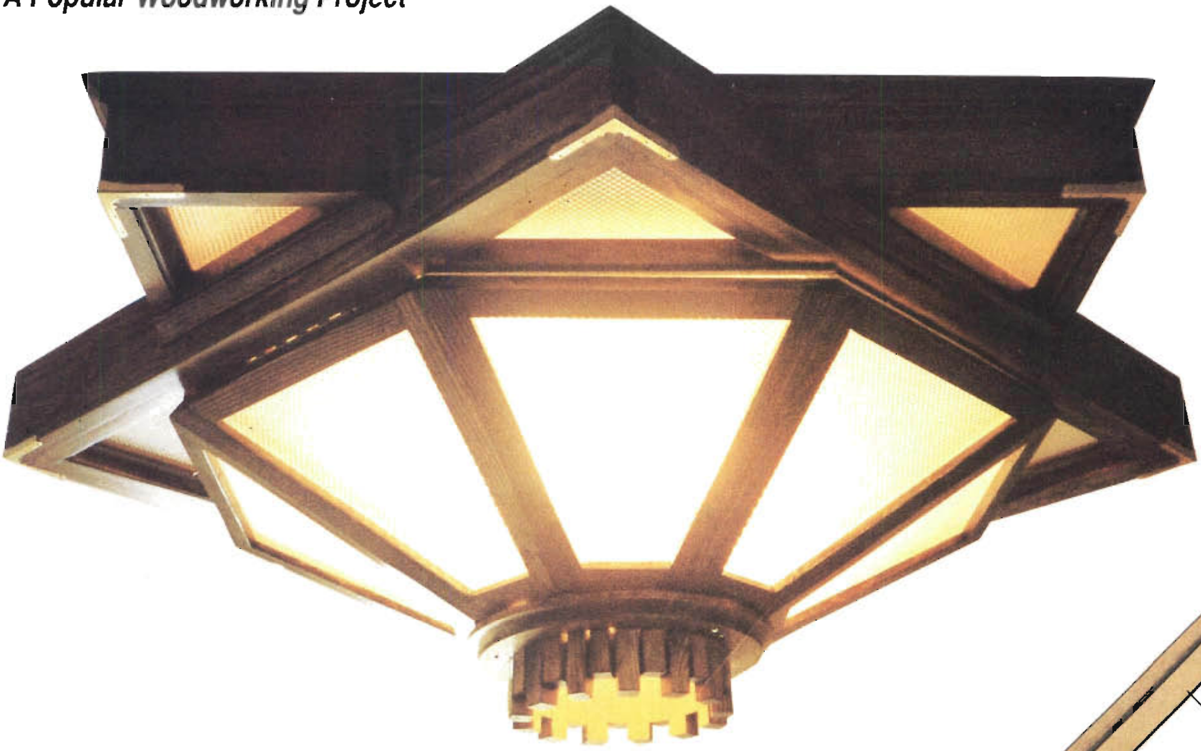
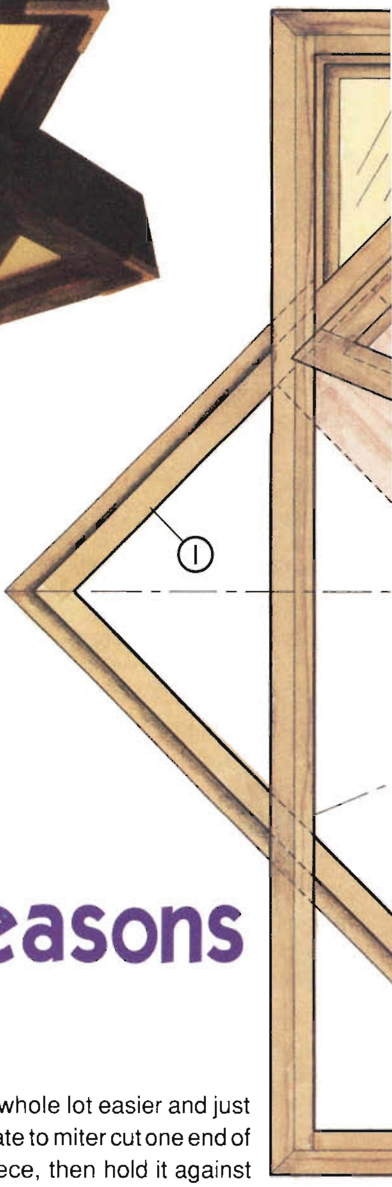




# A Light Fixture for All Seasons

**by J. T. Osterman**

Quality wooden light fixtures are few and far between, and plans for them are even scarcer. This one requires some interesting and, at times, challenging woodworking, and the results are both elegant and functional. I made it from pine, sealed and stained, but you can use any wood you choose. You'll also need some 1⁄16" thick acrylic sheeting, available at large home centers in plain translucent and patterned styles.

## Light Diffuser Panel Frames

Rip the ¾" X 1" strips needed for the panel frame sides, tops and bottoms (A, B, C and D). You'll want to rabbet the stock before sawing them to their rough lengths, so cut eight pieces, each about 48" long. Be sure you dimension them accurately—finish on the planer or sander if needed. Then cut the ⅜" X ⅜" rabbet along one edge of each, and saw the pieces to the rough lengths given in the Cutting List.

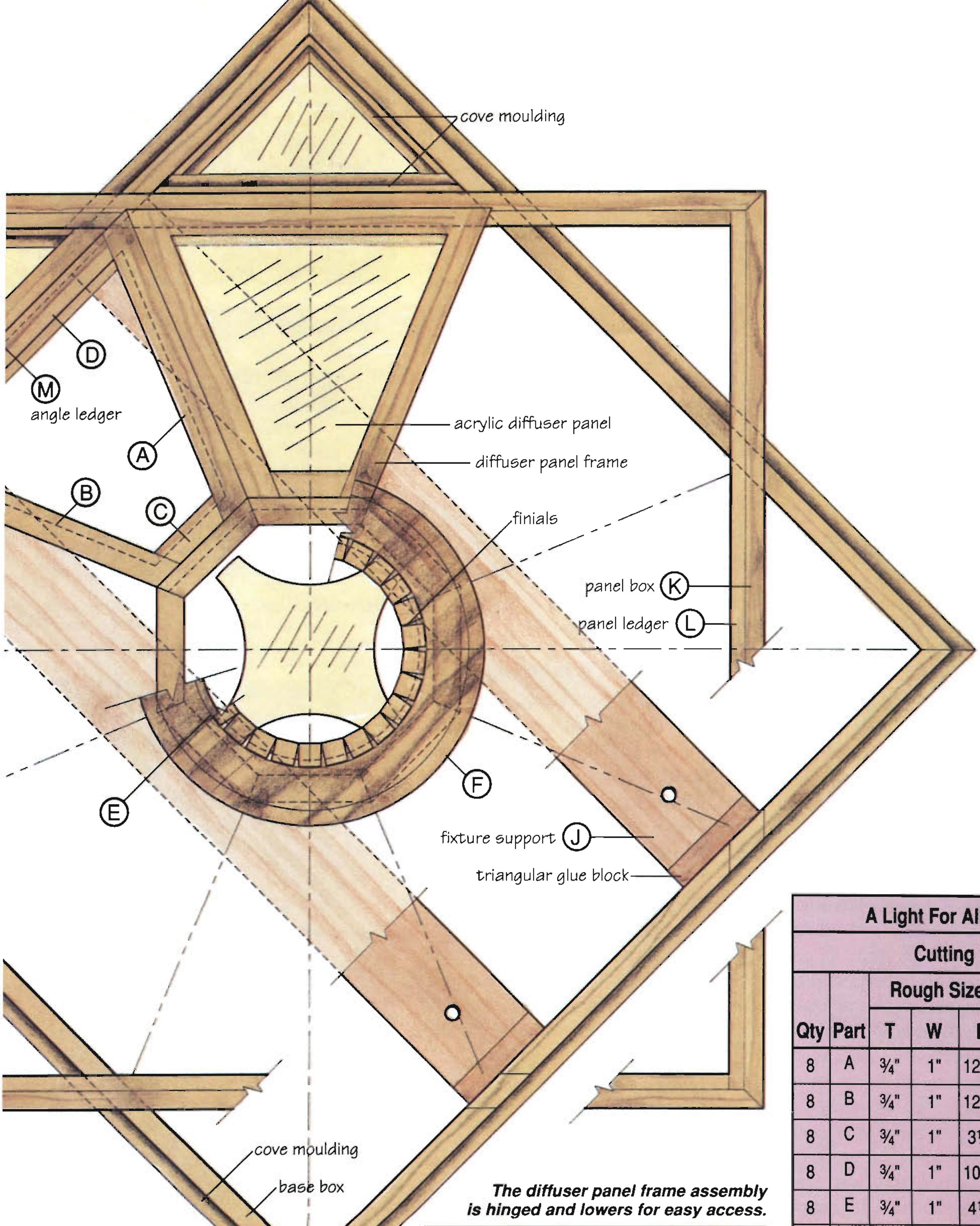
As the Figure here and the full-size pattern in the PullOut™ Plans show, the diffuser panel frames are truncated triangles 12" wide at the base, 11" high, and 4⅛" wide at the top. To get the pieces down to their finished lengths, you'll need to cross cut their ends at 70¼°—or as close to that as you can!

Begin with the left and right sides of the frames (A and B). If you know some trigonometry you can calculate their exact lengths from the angles and dimensions, but it's a whole lot easier and just as accurate to miter cut one end of a side piece, then hold it against the pattern, and mark and cut the other end. Be sure the two end cuts are parallel, and remember to make eight left and eight right sides.

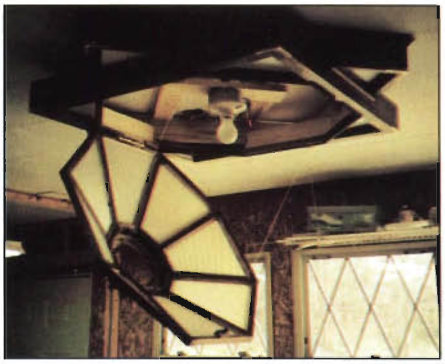
Follow the same procedure to make the top and bottom pieces (C and D), but when measuring the stock against the pattern, be sure to include the entire length of the top and bottom pieces. On the pattern their ends are marked with dotted lines indicating that they're hidden in the rabbet on the lower edge of the side pieces. Note also that the end cuts on the tops and bottoms are not parallel to each other. Now mount the dado blades and cut the ⅜" X ⅜" cross grain rabbets on the tops and bottoms to

---

***J. T. Osterman** works wood in Hickory, North Carolina.*

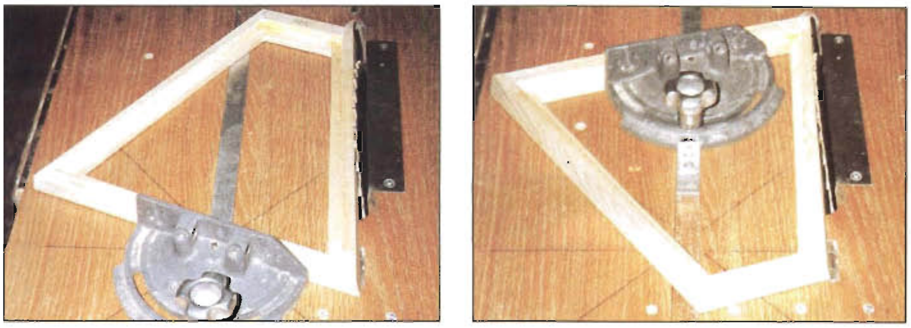


***The diffuser panel frame assembly is hinged and lowers for easy access.***

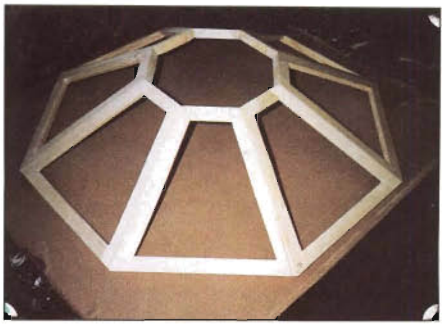


| Supplies |
|---|
| 1⁄16" thick acrylic sheeting |
| 27 feet of ⅝" X ⅝" cove moulding |
| 6" or 8" piano hinge & roller snap latch |
| adhesive foam tape |

| A Light For All Seasons | | | | | |
|---|---|---|---|---|---|
| **Cutting List** | | | | | |
| | | **Rough Size** | | | |
| **Qty** | **Part** | **T** | **W** | **L** | **Piece** |
| 8 | A | ¾" | 1" | 12⅜" | left frame sides |
| 8 | B | ¾" | 1" | 12⅜" | right frame sides |
| 8 | C | ¾" | 1" | 3⅛" | frame tops |
| 8 | D | ¾" | 1" | 10⅛" | frame bottoms |
| 8 | E | ¾" | 1" | 4½" | inside top pieces |
| 1 | F | ¾" | 11½" | 11½" | cap ring |
| 13 | G | ¾" | ¾" | 1½" | long finials |
| 13 | H | ¾" | ¾" | 1" | short finials |
| 4 | I | ¾" | 3½" | 30⅜" | base box sides |
| 2 | J | ¾" | 3½" | 30⅜" | fixture supports |
| 4 | K | ¾" | 3½" | 30⅜" | panel box sides |
| 4 | L | ¾" | ¾" | 28⅞" | panel ledgers |
| 4 | M | ¾" | ¾" | 12⅜" | angle ledgers |



*Set the miter gauge 20° out of square and cut one side of the assembled frames. Make all of these cuts, then reverse the frame and set the miter gauge 20° out of square in the other direction. The blade should be tilted 11° for both cuts.*



*Bevel and miter the inside top pieces so they fit snugly inside the cone end of the diffuser panel frame assembly.*

form the corner joints.

Check the angles with a protractor before gluing up the frames. Yellow or brown aliphatic resin adhesive has the toughness of hide glue and sets quickly. You can simplify clamping by using large rubber bands. Allow a full day for the glue to dry.

Next, clamp the eight panels together in a stack and finish sand the top and bottom edges all at once for uniformity. Then finish sand the face surfaces, and you're ready to cut the 79° miter along the side edges to join the frames to each other (Figure 1). Tilt the saw blade to 11° out of square and set the miter gauge at 20° out of square. Both angles are critical for accuracy in forming the octagon—errors will multiply! I recommend making a 79° gauge block to set the saw blade. Be sure to avoid the teeth while adjusting the blade angle with the block, as their set will throw the angle off. Use the panel frame itself to set the miter gauge. As shown in the photos above, use this setup to cut one side of all the frames; then reverse the miter gauge to 20° in the other direction to miter the other side of the frames.

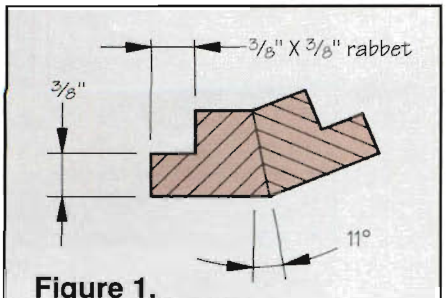
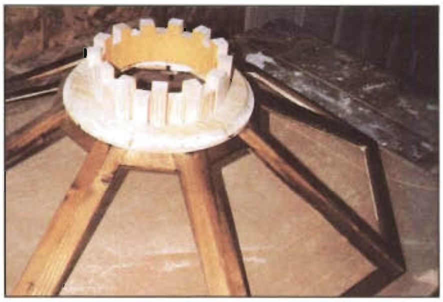


**Figure 1.
Diffuser Frame Joint**

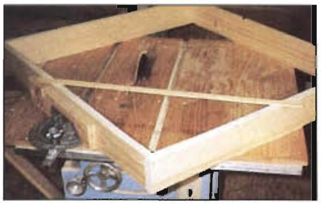
## Diffuser Frame Assembly

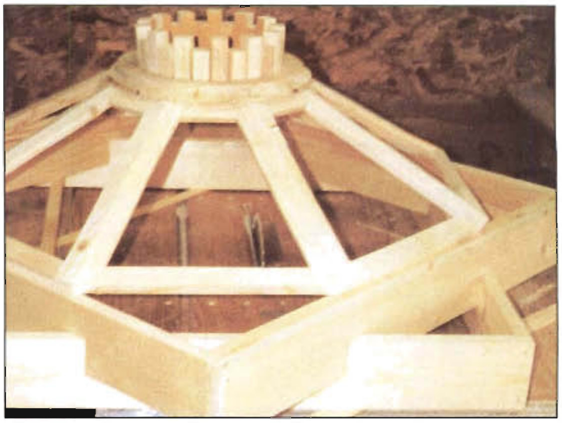
Dry assemble the eight panel frames and check the fit; then glue and clamp three of them together. Spread the glue evenly with a spatula to get a thin coat. To hold the three frames while they dry, tack a couple of scrap boards at 90° to each other on a flat surface. Rest the bottom piece (D) of the two outer frames against this right angle jig, allowing the three-frame assembly to nest itself and form the 90° angle between the bottom pieces of the outer frames. If your work has been accurate, the frames should incline at about 30°. Check the angles, and carefully clamp

*The finials (below) sit in a circular rabbet cut in the cap ring. They form a smooth curved surface on the inside of the ring, but appear "fluted" on the outside.*



*Align the panel box over the base box so all eight corner triangles are the same shape and size. Once the base box is notched and attached to the panel box, cut the panel and angle ledgers to fit.*





the sides together. Then, using another right angle jig (you'll need both coming up) repeat the procedure with three *more* frames. These subassemblies should dry for at least two hours.

You now have two subassemblies and two panel frames ready to form the complete diffuser panel frame. Use both right angle jigs to nest the frames and subassemblies, and to adjust the distance from the bottom edge of one panel frame across the octagon to the bottom edge of the opposing frame. This distance, measured between the inner *bottom* edges of the inclined panel frames, must be within 1/16" of 27⅞". Don't force the frame, but use the jigs to hold the 90° angles and this distance should dimension itself. If the dry assembly checks out, proceed with gluing and clamping and let the frame dry overnight. Sand lightly to sharpen the outside edges.

Finally, cut the eight inside top pieces (E) and glue them to the inside edge of the frame tops. Use ¾" stock for these pieces, rip a 60° bevel on one edge (blade set at 30° out of square), and miter the ends at 22½° to fit inside the octagon (see the detail to Figure 2). Seal the completed frame with a wood sealer (I used Benite from Daly's, Inc., 3525 Stoneway North, Seattle, WA 98103, tel. 206–633-4200) to control moisture.

## Finial Cap Ring

Study Figure 2 showing the cap ring (F) and finial (G and H) assembly. Cut out the ring on the scroll saw so its outside diameter is 11½" and the inside diameter 7¼". I used hardwood for this piece because it requires routing and rabbetting all the way around. Cut a ½" radius decorative cove around the top outside edge, and a ¼" wide X ⅛" deep rabbet around the bottom inside edge to hold an acrylic panel. Cut a rabbet approximately ⅜" deep X ¼" wide around the inside top edge of the ring to accept the ¾" square finials. They should nest snugly in the rabbet, leaving a fitted inside and a "fluted" outside. The number of finials you'll need depends on the exact size of the rabbet you cut. These grooves may prove a bit tricky, and the best way to cut them is on the router table, using a bit with a guide pin or bearing.

You're ready to glue the finials to the ring and the ring to the diffuser panel frame. If the joinery is accurate and the surfaces are in full contact, you shouldn't need any mechanical fasteners here. It's not structurally stressed, and is designed to be self-supporting. You will be surprised and pleased with the strength and rigidity of this semi-geodesic structure (apologies to Buckminster Fuller!). You may want to apply the finish of your choice before proceeding further.

## Base Frame

Rip the 3½" wide boards required for the base box sides (I), fixture supports (J), and panel box sides (K). While you're at the table saw, cut the panel ledgers (L) and angle ledgers (M), too. The base and panel boxes are identical, measuring 30" along the outside edges, so the finished length of the sides will depend on the corner joints. Use whatever method you like—miters will eliminate visible end grain; finger joints would add an elegant touch. I went with simple butt joints, glued and reinforced with two 6d finish nails. Set and fill the nail heads.

Cut triangular glue blocks and glue and nail them and the fixture supports in the base box as shown in Figure 3. When the glue is dry, drill a hole in the centerline of each support for ¼" bolts. Locate these holes 1¾" from the inside edge of the box frame.

The next step is to attach the two box frames to each other as shown in Figures 2 and 4 and the photos on the opposite page. Lay the base box on the bench with the fixture supports flat on the work surface, and set the panel box on top of it so that the resulting corner triangles are identical in shape and size. Then mark on the base box exactly where its sides are intersected by the sides of the panel box. At these locations cut 1¾" deep dados at

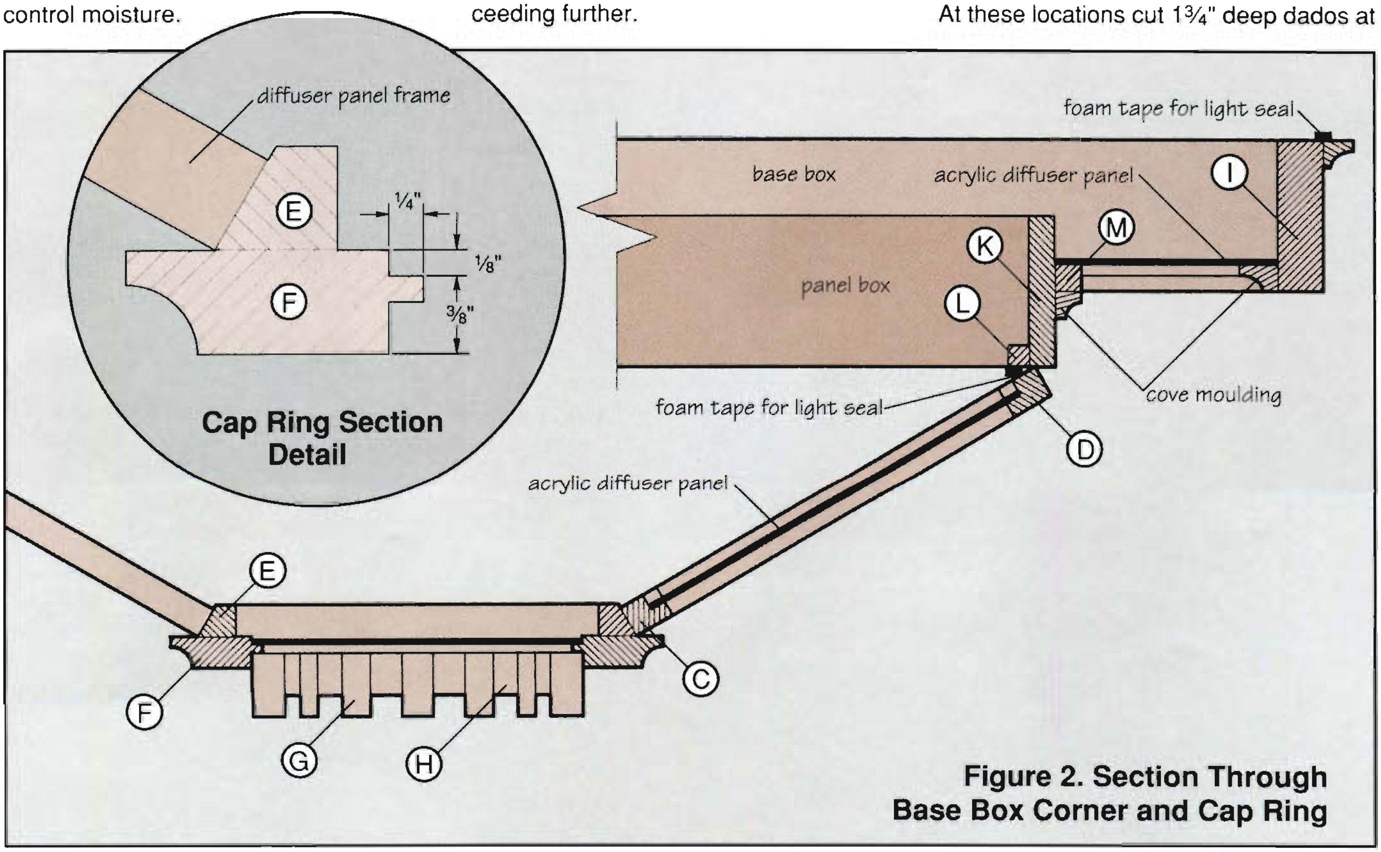


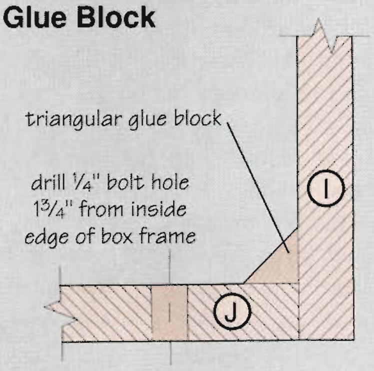
Figure 2. Section Through Base Box Corner and Cap Ring

a 45° angle to form the cross lap joints which will secure the two box frames to each other. If the cross lap joints align properly, glue and nail the box frames together to form the complete main frame.

Now trim the panel ledgers (L) so they fit inside the panel box frame. Attach them with glue and nails so they're flush with its top surface. As Figure 4 and the photos on page 66 show, the angle ledgers (M) are attached to the panel ledgers across each corner of the frame. Miter their ends 45° and nail and glue them in place. They should line up with the sides of the box frame below and form a triangle with each corner of the panel frame.

Apply ⅝" X ⅝" cove moulding to both these corner triangles and those formed in the base frame by its intersection with the panel box. The two short sides of each of these eight triangles should be so trimmed; moulding for the long side of the four triangles in the base box frame is optional. Don't put moulding on the long sides of the panel box triangles. Go ahead and apply the moulding to the sides of the base box frame so it's flush with the bottom surface of the frame.

**Figure 3. Fixture Support Glue Block**



## Assembly

You are now ready to secure the octagonal diffuser panel frame to the main frame with a 6" to 8" long piano hinge. Mortise the underside of the bottom piece of one of the diffuser panel frames and the inner edge of a panel ledger to receive the hinge leaves. You'll need to limit hinge travel, so attach a pair of nylon lines as shown in the photo on page 65. A cabinet type roller snap latch will serve as a closing lock. Add adhesive foam tape around the top surface of the panel box frame (including the hinge area) in order to keep light from shining out through the joint. Also, if you choose to mount the fixture flush against the ceiling, add foam tape on the base box frame edges to keep light from shining through the fixture–to–ceiling joint. Finish the inside wood surfaces of your new light fixture with a white, high gloss, oil–based enamel.

Heat generated by the lamp will exit through the open–backed triangles in the corners of the panel box frame. This ventilation is essential—warm air cooling overnight and trapped in the fixture can cause moisture to collect in measurable amounts.

## Finishing and Installation

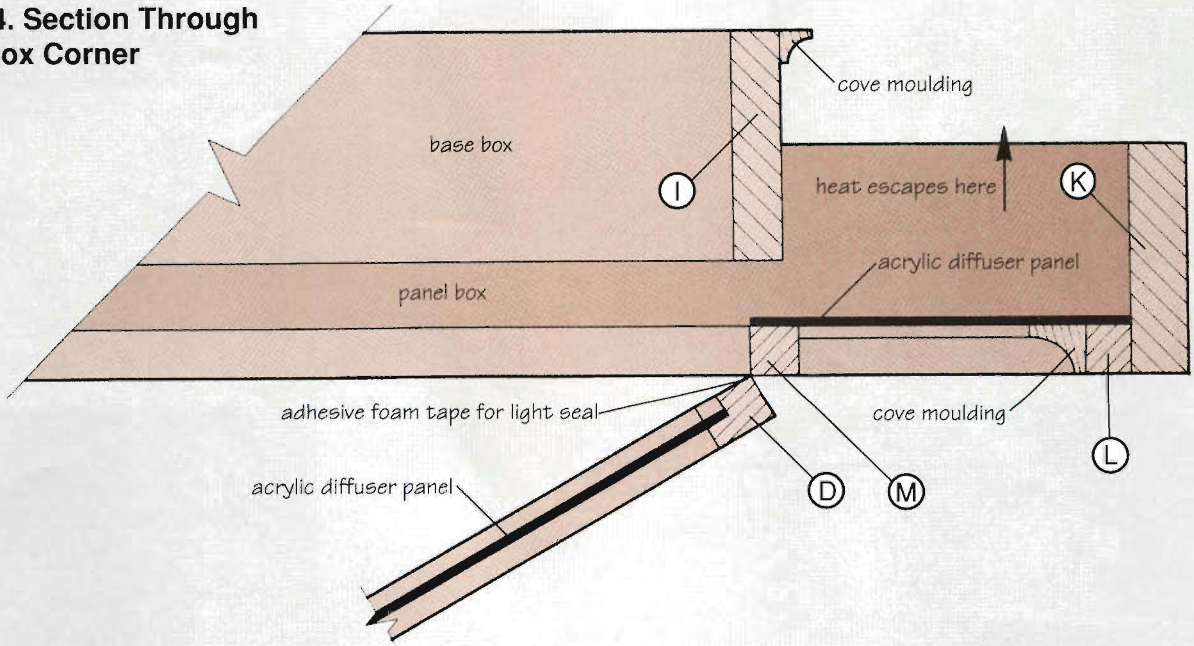
How you finish the outside and the acrylic you select for the panels, as well as how you install the fixture, will depend on the room decor. As the photos show, I stained mine and added brass corners (available from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374-9514, tel. 612-428-8668, item #27516). When the inside and outside finishes are dry, install the lights—either two 24" fluorescent strips or an incandescent fixture.

Cut the acrylic to fit the diffuser frames, corner triangles, and the center ring (see the PullOut™ Plans for the latter). Be sure to leave ventilation holes in the center ring as shown in the illustration on page 65.

Because the plastic panels will expand when heated, fit them loosely in their frames. The diffuser panels can be tacked in place with a hot glue gun or clear silicone caulking—which will also provide dust sealing—but don't attach the acrylic panels in the eight corner triangles if you want to be able to remove them for cleaning.

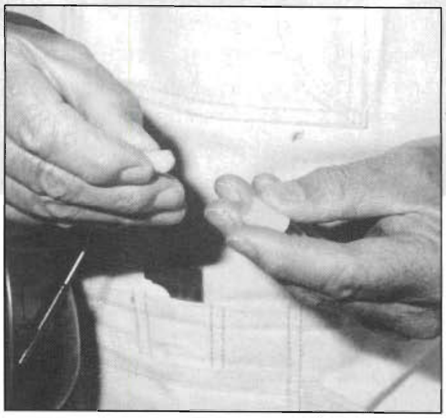
You can flush–mount the unit to a ceiling or suspend it using chains running from a central hanger to the four corners of the base box frame. If you suspend it with chain, thread clear plastic–insulated cord through the links for a neat looking job. You'll also want to make a cover for the back of the base box to reflect light down and keep it from shining upward. Remember to leave the backs of the panel box corner triangles open for ventilation. PW

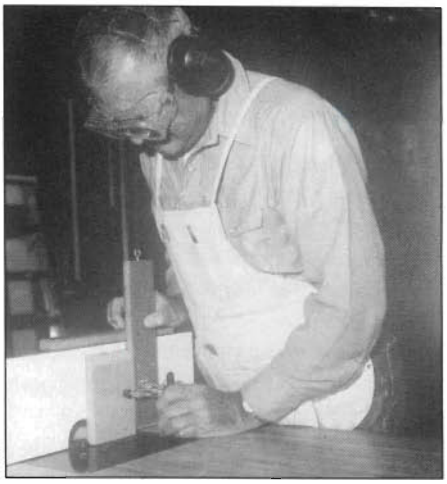
**Figure 4. Section Through Panel Box Corner**



For best protection, wear both an ear-muff–type protector and foam ear plugs.

# Don't Go Deaf in Your Shop!





author

### by Hugh F. Williamson, M.D.

We've all heard horror stories about shop accidents in which somebody lost his sight or perhaps a finger or two. Because these accidents happen all at once they are dramatic and leave a lasting impression. Let me tell you about a much less noticeable yet equally insidious injury that may be occurring every day you're in your shop: damage to your hearing.

As we get older we generally lose some hearing ability just as a natural part of the aging process. This gradual loss is known as *presbycusis* (***presbys*** is Greek for "old man" and ***akousis*** means "hearing"). Add to this the noisy environment of your shop and you have a serious potential for sensorineural hearing loss. Have you ever attended a woodworking show or seminar and noticed the number of older woodworkers wearing hearing aids?

Hearing impairment can be caused by disorders of the outer, the middle, or the inner ear (see the illustration on page 71). Impacted wax in the ear canal is an example of an outer ear problem. The presence of fluid is a middle ear problem. Disorders of

---

***Hugh F. Williamson*** *is a woodworker in Tucson, Arizona, and a frequent contributor to* Popular Woodworking.

## Relative Scale of Decibels

| | | |
|---|---|---|
| | 180 | rocket launching pad |
| PAINFUL | 140 | gunshot, jet engine |
| | 130 | air raid siren, jackhammer |
| | 120 | chainsaw |
| EXTREMELY LOUD | 110 | loud rock music, sandblasting |
| | 100 | diesel truck, power mower |
| VERY LOUD | 95 | motorcycle, pneumatic drill |
| | 90 | heavy truck, subway |
| | 85 | |
| LOUD | 80 | heavy traffic |
| | 75 | vacuum cleaner |
| MODERATE | 60 | normal conversation |
| | 50 | refrigerator |
| | 40 | |
| FAINT | 30 | whisper |

Most shop power tools are above the 85 dB level requiring hearing protection by OSHA

## Who Makes Hearing Protection Devices?

David Clark Co.,Inc.
Box 15054
Worcester, MA 01615-0054
tel. 508-756-6216

Curtis Safety Products Co., Inc.
91 Stafford St.
Worcester, MA 01603
tel. 508-754-3906

Conney Safety Products Co.
Box 4190
Madison, WI 53711
tel. 1-800-356-9100

Direct Safety Co.
7815 S. 46th St.
Phoenix, AZ 85044
tel. 1-800-528-7405

Willson Safety Products
Box 622
Reading, PA 19603
tel. 215-376-6161

the inner ear, such as the loss of hair cells from constant exposure to loud noise, are the type that should especially concern woodworkers.

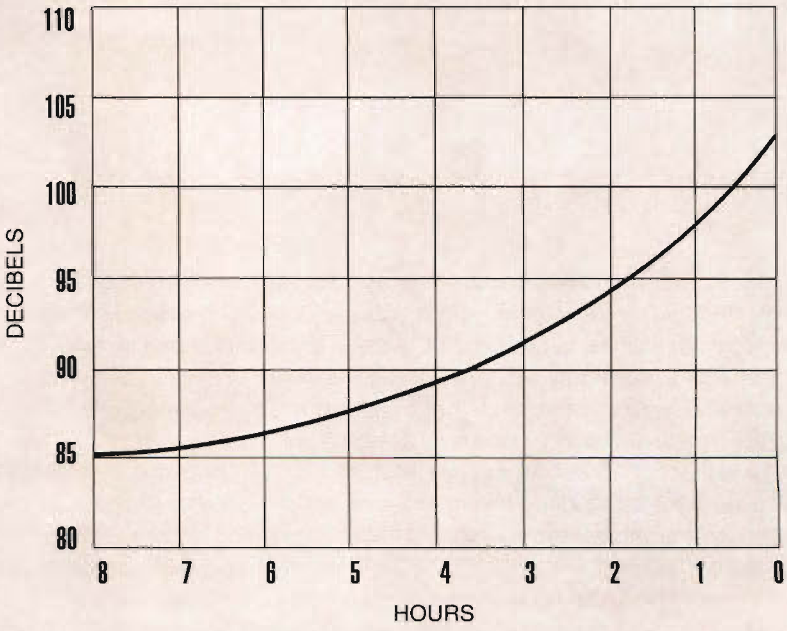
Noise can not only cause deafness, but it has also been shown to have a relationship with hypertension, sleep disorders and cardiovascular disease. Continous exposure for eight hours a day over a number of years to noise levels exceeding approximately 80 decibels (dB) can cause permanent hearing loss. The degree of hearing damage will vary with the individual, but unfortunately noise–induced hearing impairment is permanent!

Sound levels are measured in logarithmic units called decibels (dB) and the frequency is measured in cycles per second or Hertz (Hz). The human ear does not hear all frequencies, the normal range being 20 to 20,000 HZ, and the point where we begin to hear sounds is around zero dB. At 140 dB noise can become painful. All loud noises, however, are dangerous to your hearing health, and those in the very high and very low frequencies inflict more than their share of damage.

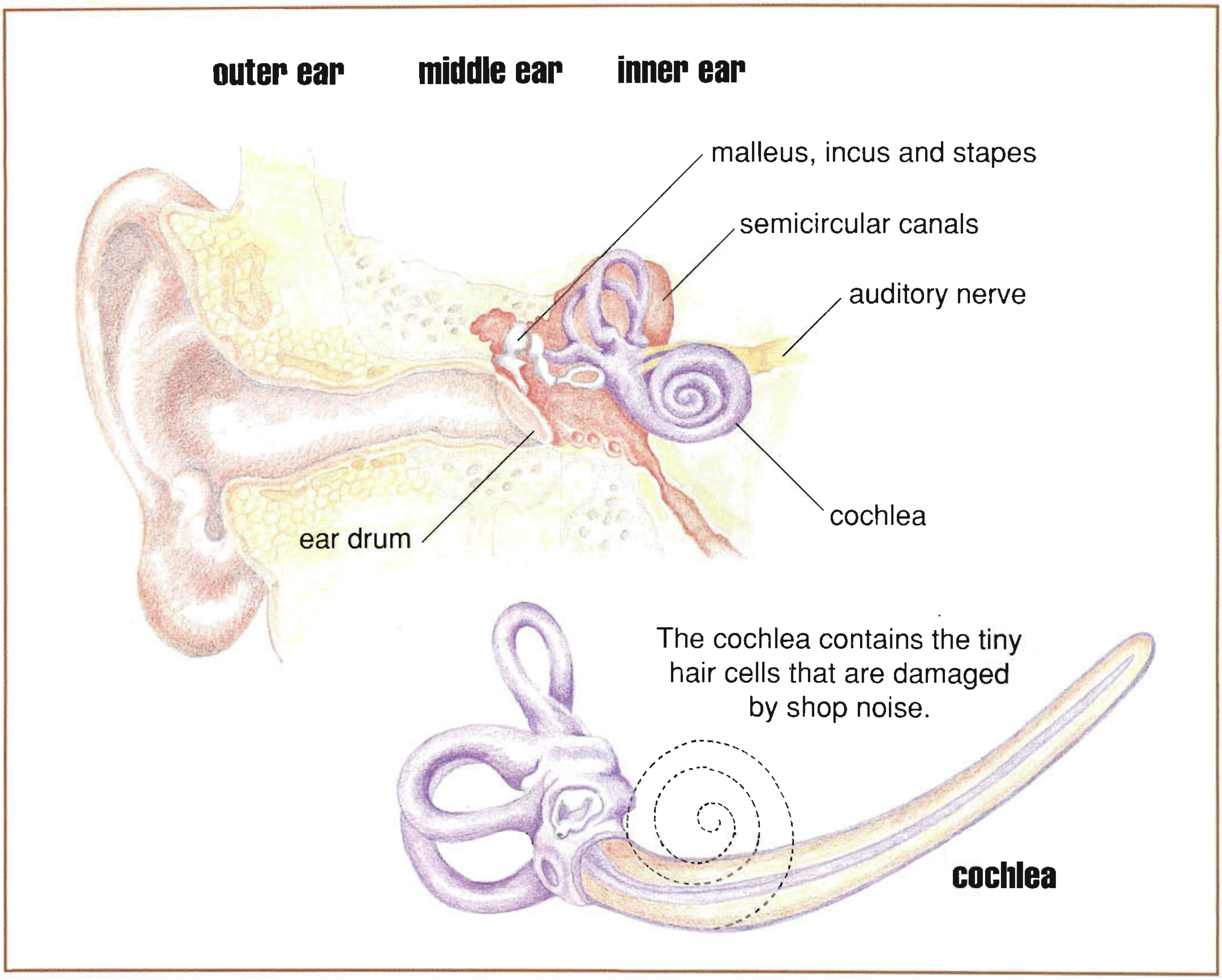
Industry has learned the hard way that the hearing of employees subjected to noisy working conditions must be protected, and home woodworkers should take a lesson, too. Since August 22, 1981 OSHA requires employers to provide a hearing conservation program to all employees who are exposed to an average of 85 dB or greater. Almost all of your power tools make this much noise or more.

Many factors combine to determine the sound conditions in the woodshop—its size, shape and construction, the type, number and arrangement of power tools, the type of cutters, the hardness of the material being worked, feed rates, and so on. The noise level in the average woodworking shop exceeds the safety limits of 85 dB set by OSHA. And if your shop is

## Recommended Maximum Exposure to Noise



Note that the length of exposure time required to cause hearing damage decreases rapidly as the sound level increases above 85 dB.



The cochlea contains the tiny hair cells that are damaged by shop noise.

located by an airport or highway you may have an additional source of noise compounding the danger.

To minimize hearing loss, use the protective equipment commonly found in shop catalogs or in local hardware and sporting goods stores. Such protection generally comes in one of two forms: the plastic or rubber ear plugs that fit into the external ear canal, and the earmuff–type protectors that cover the entire external ear. Both have advantages and disadvantages, and the protection they offer when used properly has been rated in dB. The higher the dB number, the greater the protection.

You can determine the approximate number of dB reaching your ear by subtracting the dB on your hearing protection from the theoretical dB noise level in your shop. The protection afforded by any type of ear protection will vary considerably over the sound frequency range, and this information is usually supplied on the label by the manufacturer.

Ear plugs are often connected by a chain or cord and can be carried around your neck when not in use. Also available are disposable plastic ear plugs that you compress with your fingers before inserting so they'll expand in the ear canal to make a tight fit. These plugs are easy to insert if you pull up on the ear lobe and make a chewing motion with your jaw as you place the plug in the ear canal.

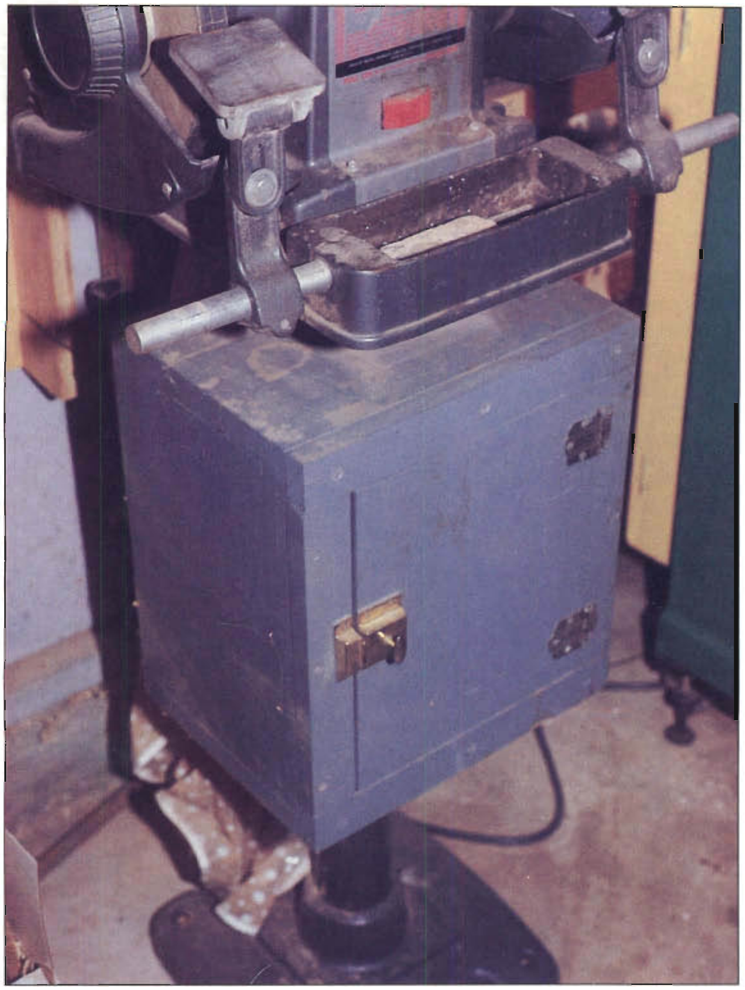
Earmuff–type protectors come in a number of styles. The more expensive muffs contain a liquid or a gel which creates a uniform pressure seal around your ear. If you're going to be in your shop knocking out stiles, rails and raised panels from oak for a large cabinet, I suggest that you use both ear plugs and muffs together to increase your protection.

When you first start wearing hearing protection you may feel a little uncomfortable. You won't immediately be in tune with the noise that you've been accustomed to and may have used to determine how a machine is responding, the precise rate of feed, and other variables. This situation will pass with experience and you will adjust and adapt to a much more quiet environment. It may take some time, but your hearing is worth it!

You may get the urge to skip the hearing protection for small projects, thinking that the saw will be on for only a few minutes. But these few minutes accumulate into long hours over the years, and the injury to the tiny hair cells is cumulative.

Inform your fellow workers, your wife, and everybody who might enter your shop to approach you within your line of vision while you're working with power tools. With proper hearing protection in place, you won't be able to hear them approach and you don't want to be startled.

And don't forget that there is more to shop safety than just hearing protection. Always wear the eye and respiratory protection demanded by the task you're performing. PW



# Pedestal Grinder Storage Cabinet

### by Devore O. Burch

Most woodworkers have to set up shop and putter around in a very limited area, but it's my observation that we rarely utilize that space as efficiently as we might. The little cabinet described below puts an otherwise wasted space to good use while keeping accessories close to the machine which needs them. It clamps right on to the tubular column of a pedestal grinder. The cabinet pictured here was tailored for my grinder which takes 8" wheels; it stores spare wheels, wheel dressers, buffing compound, nuts and flanges. You may want to alter the design to fit your needs.

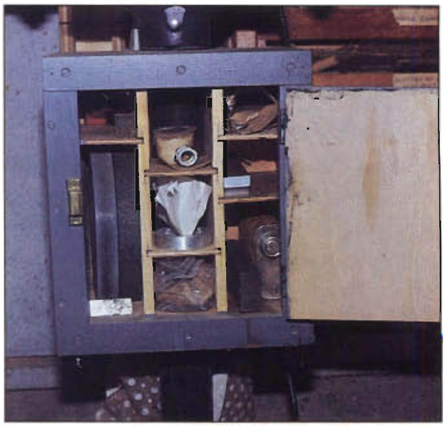
Start by cutting the pieces for the cabinet top and bottom. Each consists of two pieces, the top and bottom panels proper (A) and the pressure blocks (B). The two top pieces—one panel and one pressure block—can be cut from one board (I used yellow pine), as can the two bottom pieces, but don't saw them apart yet. First cut a ¼" wide X ½" deep rabbet on each end to receive the sides (C), and a ¼" wide X ½" deep rabbet for the back (D). Also cut the ½" wide X ¼" deep dadoes to receive the vertical dividers (E).

Now cut a round hole to match the pedestal column on your grinder, or if you prefer, lay out the circles on the panels, cut the top and bottom panels apart, and then make the circular cuts. The kerf between the panels (A) and the pressure blocks (B) allows a little take-up space for clamping the cabinet to the column.

Cut the sides (C) to size and rabbet the back edges for the back panel (D). Cut ¼" X ¼" dadoes for the left and right shelves (F). Now saw those shelves, the center shelves (G) and the back from ¼" plywood. Make the vertical dividers (E) from pine or other solid lumber. Dado the dividers for the left and right shelves on one side and on the other for the center shelves (G), and you're ready for assembly.

Using glue and 6d finishing nails, attach the sides to the top and bottom panels while fitting in the shelves and dividers. Do not nail or glue the top and bottom pressure blocks to the sides. Drill holes as shown in the Figure for ¼" X 4" lag screws. This method permits movement of the pressure blocks so the cabinet can tightly grip your grinder's pedestal column.

Now cut the face frame pieces (H and I) from solid lumber and nail and glue them to the front of the cabinet. Cut the door (J) to size from ¾" plywood, install the latch and hinges, and apply the finish of your choice. Mount the cabinet on the grinder column and tighten the lags, stuff the cabinet with grinder accessories, and you've put some typically useless space to work. PW



author

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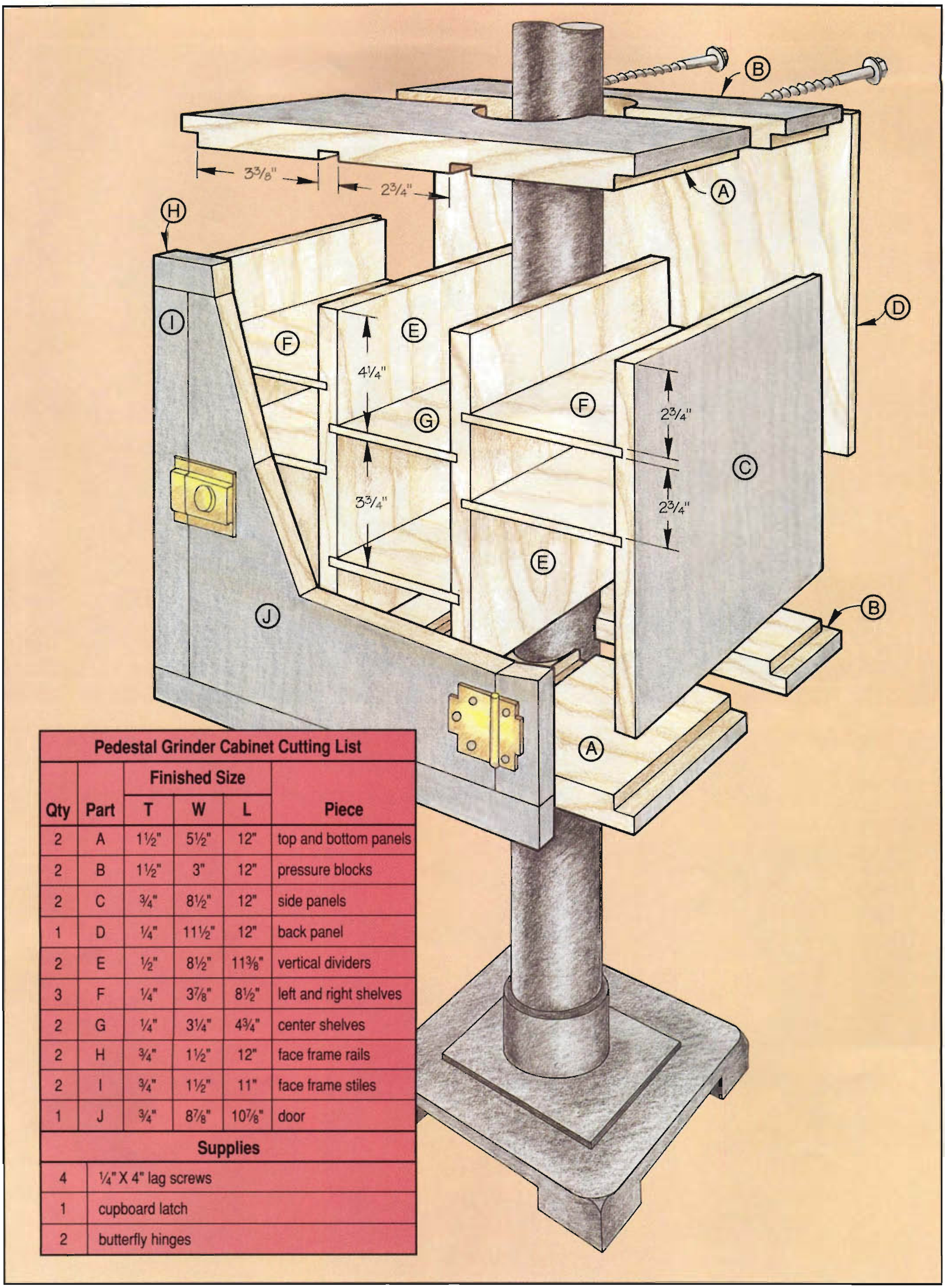
***Devore O. Burch*** *is a woodworker in Fort Worth, Texas and a frequent contributor to* Popular Woodworking.



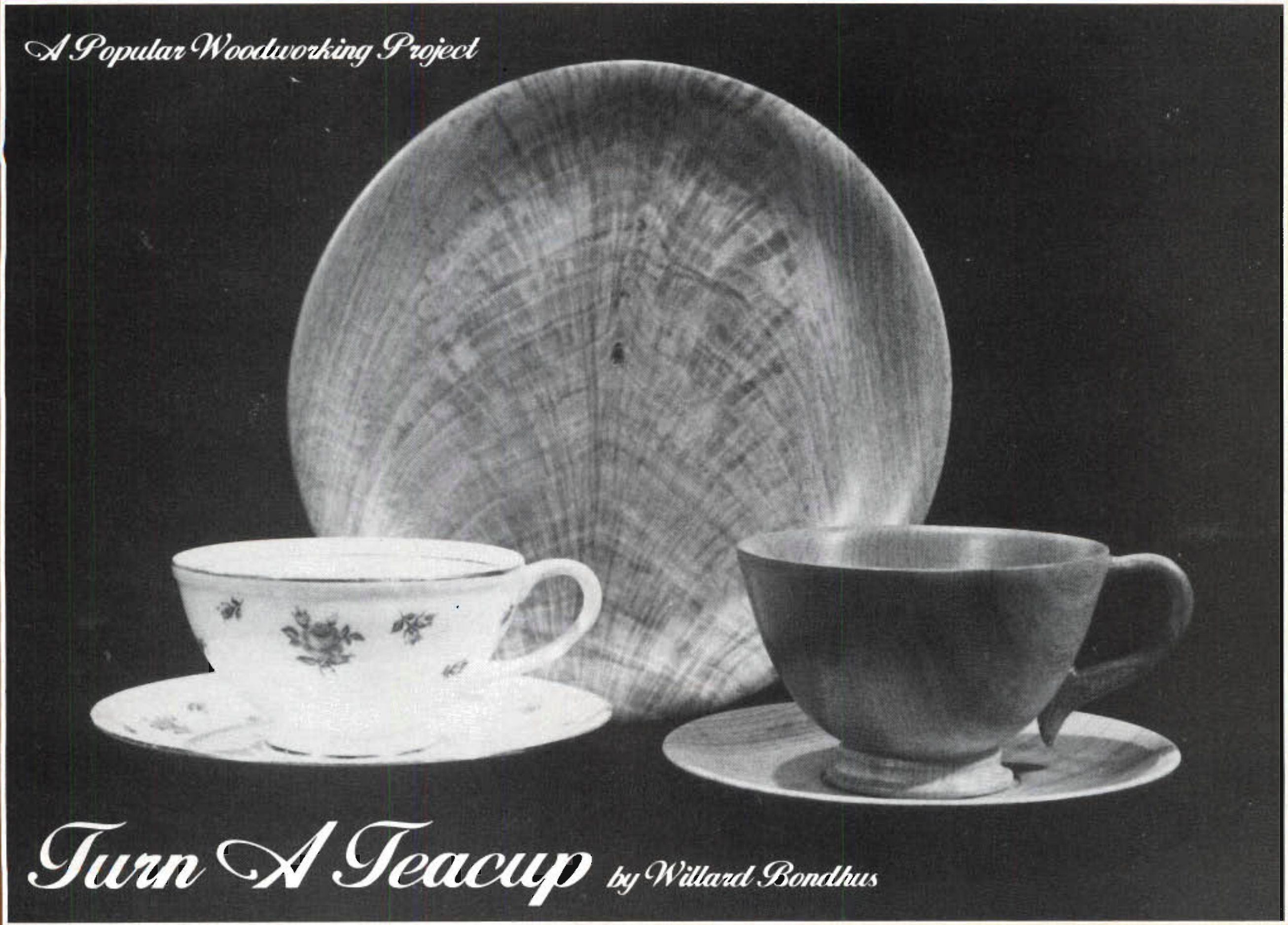
## Pedestal Grinder Cabinet Cutting List

| Qty | Part | Finished Size T | W | L | Piece |
|---|---|---|---|---|---|
| 2 | A | 1½" | 5½" | 12" | top and bottom panels |
| 2 | B | 1½" | 3" | 12" | pressure blocks |
| 2 | C | ¾" | 8½" | 12" | side panels |
| 1 | D | ¼" | 11½" | 12" | back panel |
| 2 | E | ½" | 8½" | 11⅜" | vertical dividers |
| 3 | F | ¼" | 3⅞" | 8½" | left and right shelves |
| 2 | G | ¼" | 3¼" | 4¾" | center shelves |
| 2 | H | ¾" | 1½" | 12" | face frame rails |
| 2 | I | ¾" | 1½" | 11" | face frame stiles |
| 1 | J | ¾" | 8⅞" | 10⅞" | door |

**Supplies**

| Qty | Item |
|---|---|
| 4 | ¼" X 4" lag screws |
| 1 | cupboard latch |
| 2 | butterfly hinges |

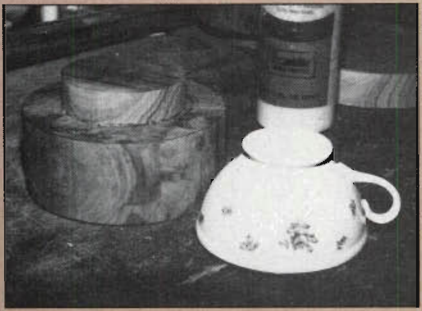
*A Popular Woodworking Project*



# Turn A Teacup

*by Willard Bondhus*

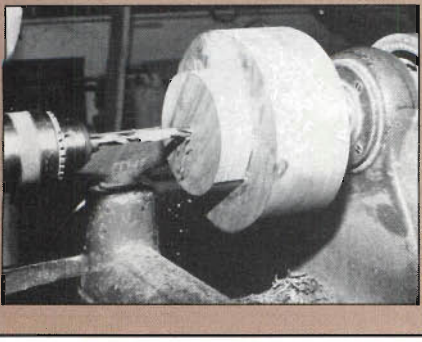
**This cup and saucer is a copy of a set from my kitchen. You may wish to copy mine—or copy some from your own kitchen. Here's how.**



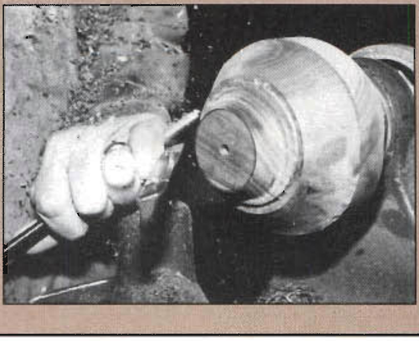
## Shape the Outside

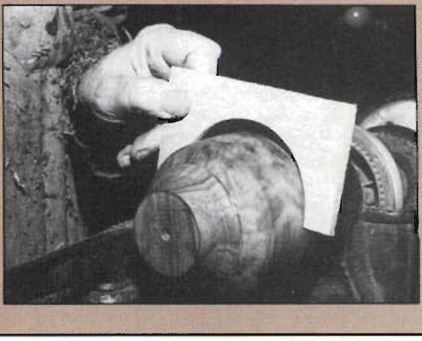
Bandsaw 8/4 stock to the rough diameter for your teacup. Glue some 4/4 stock to the blank with some grocery bag paper in between. You'll drive your screw chuck into this material; then pop it off with a chisel when you're done.

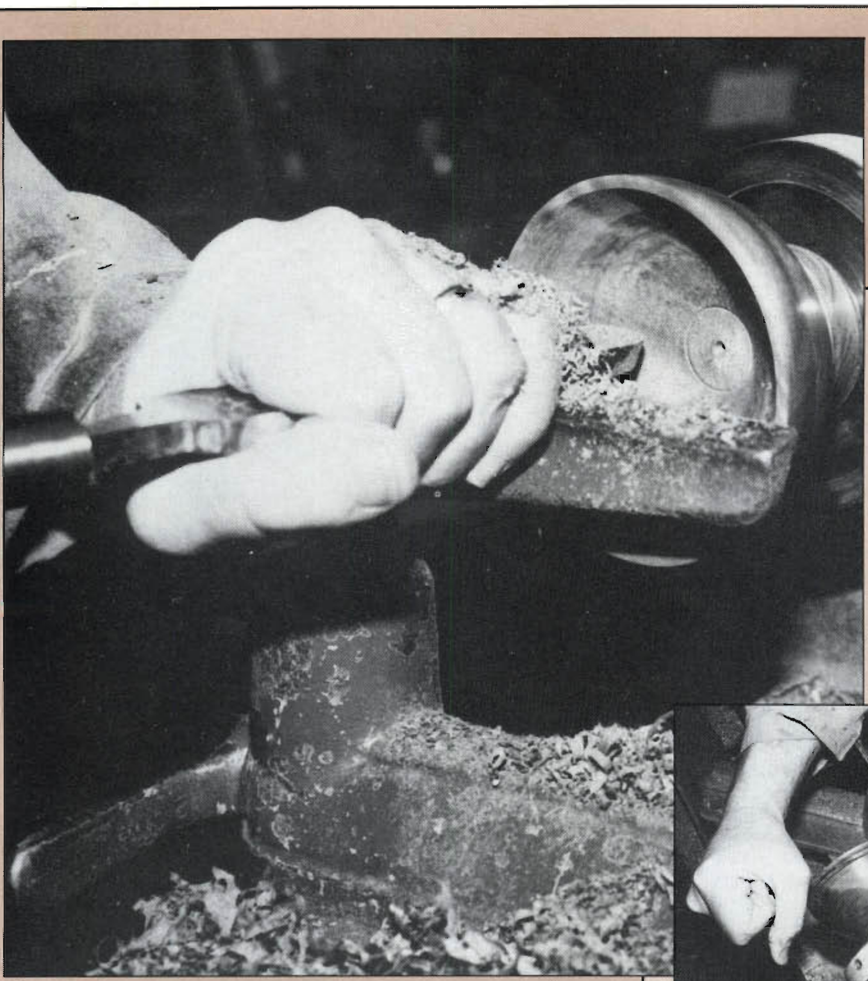
Find the center of the blank and attach the faceplate, mount it on the lathe, then drill for the screw chuck. While it's on the faceplate, turn the outside to shape. I use templates to check the diameter and profile (see the PullOut™ Plans).



photos by the author



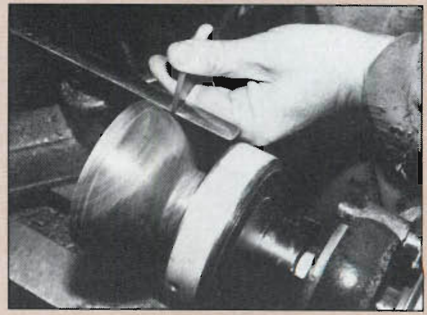


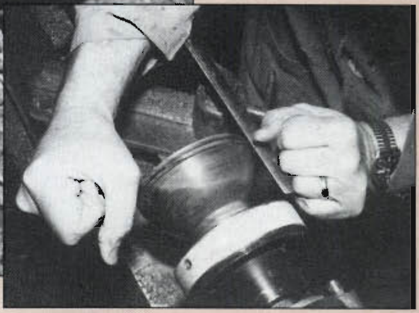


## Hollow the Inside

Mount on the screw chuck and hollow with gouges for as much as you can. Use a scraper with a good burr to finish the inside, and you might not need to use sandpaper.

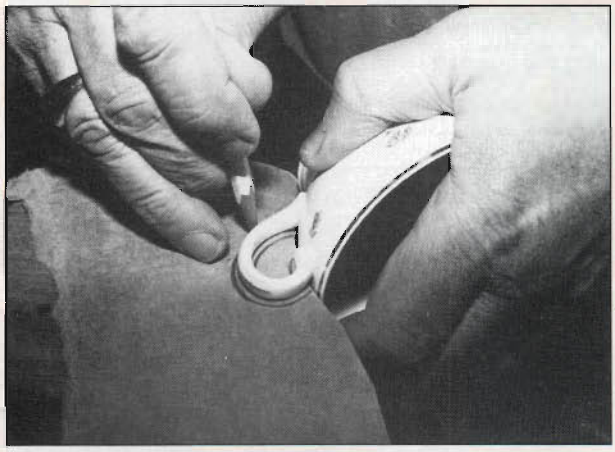
## Decorate the Rim





Use the corner of a parting tool to make a small groove or two.

Burn the detail in with some baling wire held tight while the cup spins fast.



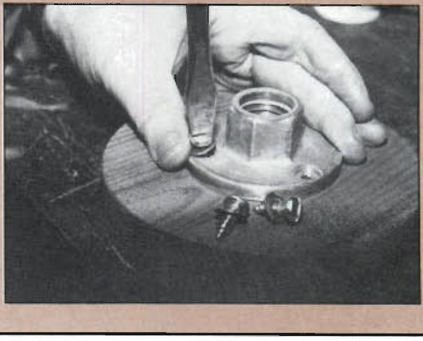
## Shape the Handle

Cut a curve in some ¼" solid stock that matches the profile of your turned cup. Trace the pattern from the PullOut™ Plans onto the stock, saw it out on the scroll saw and shape it with a knife and sandpaper. After fitting it to the cup, I use five-minute epoxy to attach it.

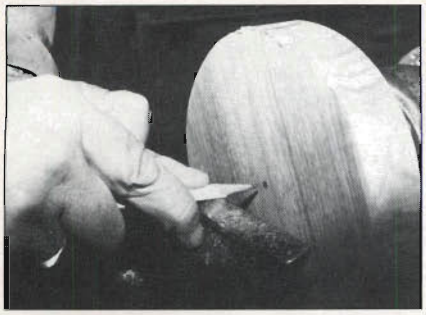
## Start on the Saucer

Rough some more 8/4 stock to the diameter of your saucer.

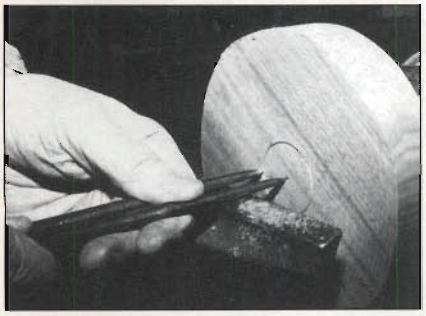
Screw the faceplate to the surface that will be the top of the saucer.



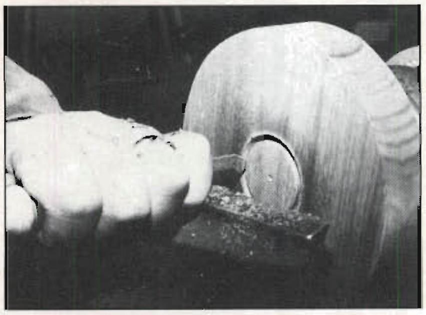
## Cut a Recess



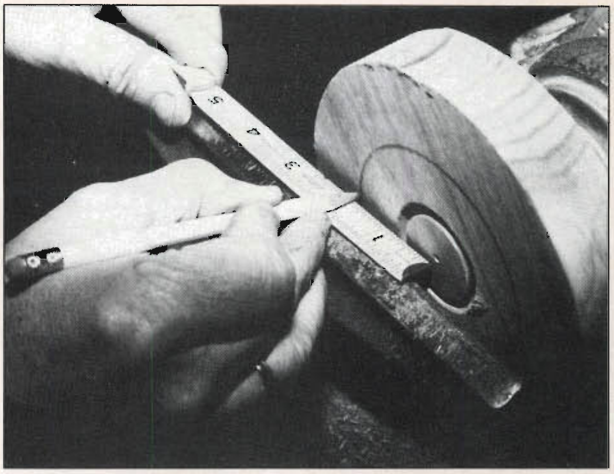
Find the center by holding a pencil to the spinning blank. Centrifugal force will pull it to the center.

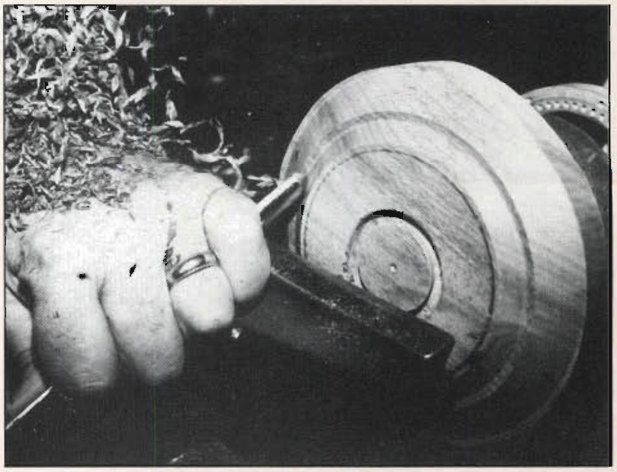


Set the dividers at 1½" to scribe the cut for the spigot chuck. My spigot chuck came from *Craft Supply Co.*, 801-373-0917.



Use a parting tool to cut the stub.

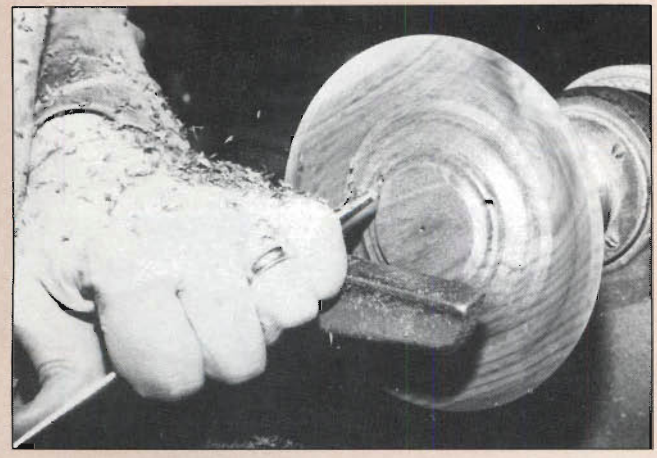




## Shape the Outer Rim

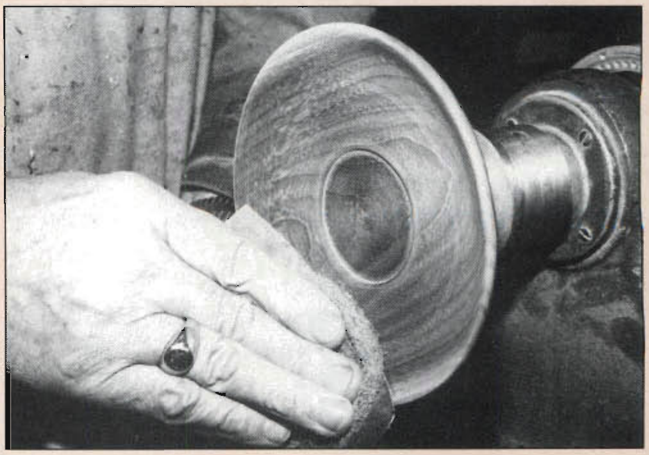
Mark 2" from center as the foot of the saucer, and use a gouge to shape the outer surface above the foot.

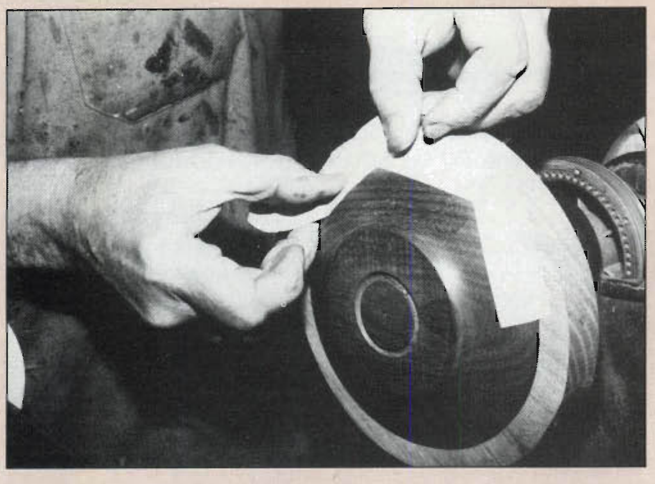
Remove the faceplate and turn the stock around. Fit the stub into the spigot chuck. As you turn, you'll cut away the screw holes that held the faceplate.



## Shape the Top Surface

Cut a recess that fits the bottom of your teacup. Finish sand the surface before proceeding.

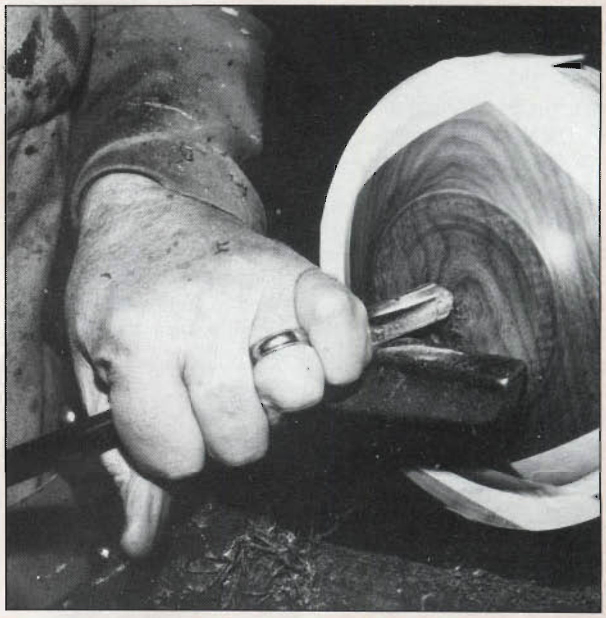




## Finish the Foot

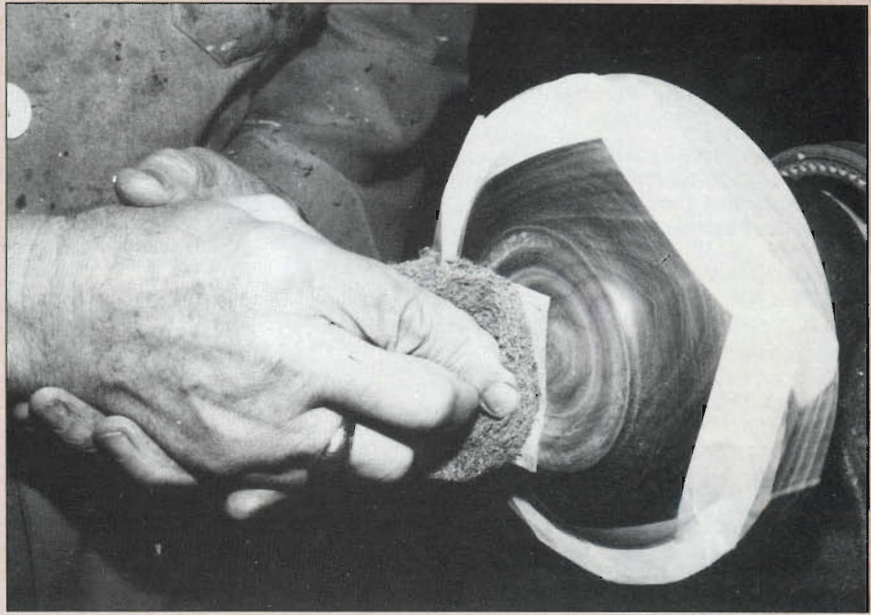
Screw a large hardwood disk to a faceplate, and cut a tapered recess in it at the diameter of your saucer. If you size this groove right, you can get a vacuum fit; I taped the stock in place just in case.

photos by the author



Pivot the gouge like a lever to hollow the area under the foot. Rotate the tool so the lower edge does the cutting.

I use steel wool to back up my sandpaper. It conforms to the shape and dissipates the heat helping the paper (and my fingers) last longer. I finish with several coats of Deft®.



These teacups won't take tea or coffee, but they'll make a welcome addition to any cup collection. PW

***Willard Bondhus** worked for a magazine called* The National Carvers Review *for 10 years before it ceased publication.*

# Calendar

## Events of Interest to Woodworkers

**If your group is having an event you'd like other woodworkers to hear about, send us the facts at least three months before the opening date. We will publish it in *Calendar* free of charge.**

### California

**Workshops:** Tools and Techniques, Finishing, Projects, Krenov (June-August), College of the Redwoods, 440 Alger St., Fort Bragg, CA 95437. Tel. 707-964-7056
**Exhibition:** Design in Wood (June 18-July 7), Del Mar Fair Entry Office, 2260 Jimmy Durante Blvd., Del Mar, CA 92014-2216. Tel. 619-755-1161
**Show:** Kern River Carvers (June 8-9), California Carvers Guild, 250 San Simeon Avenue, San Simeon, CA 93452. Tel. 805-927-4718
**Fair:** California Northcoast's Woodworking Tradition (July 12-14), College of the Redwoods, 7351 Tompkins Hill Road, Eureka, CA 95501-9302. Tel. 707-445-6700
**Show:** San Fernando Valley Carvers (July 27-28), California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. Tel. 805-927-4718
**Class:** Tool Clinic (July 27) & Building a 10' Novia Scotia Skiff (August 3-10), National Maritime Museum, Crissy Field, San Francisco, CA 94129. Tel. 415-929-0202
**Conference:** The Summer Woodworking Conference, Biola University, La Mirada (August 1-4), The Summer Woodworking Conference, 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. 800-826-8257

### Colorado

**Classes:** Woodworking, Finishes, Canoe Building, Furniture Design, Running A Business, Carving, Planemaking (June-August), Anderson Ranch Arts Center, Box 5598, Snowmass Village, CO 81615. Tel. 303-923-3181

### Connecticut

**Show:** 16th Spring Crafts Festival, Berlin (June 7-9), Arts & Crafts Festivals, Inc., Box 412, Canton, CT 06019

### Maine

**Workshops:** Boatbuilding, Carving, Junior Woodworking (July 29-August 14), Rockport Apprenticeshop, Box 539, Rockport, ME 04856. Tel. 207-236-6071

### Maryland

**Workshops:** Ward Foundation Wildfowl Carving (June 9-23), Ann Anderson, 1-800-742-4988

### Massachusetts

**Retreat:** Woodworking Association of North America, Cape Cod (June 9-14), WANA, Box 706, Plymouth, NH 03264
**Show:** Berkshire Crafts Spectacular, Great Barrington (July 20-21), United Craft Enterprises, Box 326, Masonville, NY 13804. Tel. 607-265-3230

### Michigan

**Class:** Building the Norwegian Pram with Oars (July 17-24), John Wilson, 500 E. Broadway Hwy., Charlotte, MI 48813. Tel. 517-543-5325
**Show:** 6th Annual Gogebic Range Carvers & Woodworkers, Oddonnel Civic Center, Ironwood (July 27-28), Anthony Gonsowski, E-4415 Lake Rd., Ironwood, MI, 49938. Tel. 906-932-0343

### Minnesota

**Exhibition:** Upper Midwest Woodcarvers (July 22-26), Harley Schmitgen, 311 E. 14th St., Blue Earth, MN 56013. Tel. 507-526-2777

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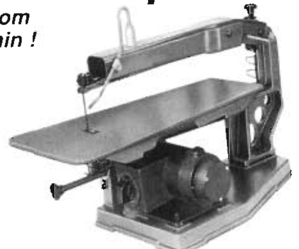

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## New Jersey

**Show:** Arts & Crafts Show, Brookdale Park, Montclair (June 22-23), Rose Squared Prod., 12 Galaxy Court, Belle Mead, NJ 08502. Tel. 908-874-5247

## New York

**Exhibition:** New Furniture (through August 25), American Craft Museum, 40 W. 53rd St., New York, NY 10019. Tel. 212-956-3535

## North Carolina

**Classes:** Woodworking, Furniture, Carving (June-July), Donna Jean Dryer, Penland School, Penland, NC 28765. Tel. 704-765-2359

**Classes:** Carving & Turning (June-August), John C. Campbell Folk School, Rt. 1 Box 14A, Brasstown, NC 28902. Tel. 1-800-562-2440

**Classes:** Windsor & Ladderback Chairmaking, 17th Century Joinery, Shaving Horse, Green Woodworking with Kids (June-August), Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753. Tel. 704-656-2280

## Ohio

**Exhibition:** Int'l Turned Objects Show, Canton Art Institute, Canton (through June 9), Wood Turning Center, Box 25706, Philadelphia, PA 19144. Tel. 215-844-2188

## Oklahoma

**Show:** Eastern Oklahoma Woodcarvers 15th Annual, Kensington Galleria Shopping Mall, Tulsa (July 12-14), Tom and Vera Hamilton, 701 W. Kiowa, Cleveland, OK 74020. Tel. 918-358-2685

## Oregon

**Workshops:** Japanese Tools & Joinery (June 24-28) & Finishing Techniques (July 15-19), Oregon School of Arts & Crafts, 8245 SW Barnes Road, Portland, OR 97225. Tel. 503-297-5544

## Pennsylvania

**Seminars:** Woodturning for Cabinetmakers (June 8-9) & Restoration (June 22-23), Olde Mill Cabinet Shoppe, 1660 Camp Betty Washington Rd., York, PA 17402. Tel. 717-755-8884

**Show:** Country Meadows—A Craft Marketplace, Mosiertown Rd., Saegertown, (July 6-7, 13-14), Country Meadows, 1069 Silliman, Erie, PA 16511. Tel. 814-899-2747

## Tennessee

**Workshops:** Woodturning (June-August), Arrowmont School of Arts and Crafts, Box 567, Gatlinburg, TN 37738-0567. Tel. 615-436-5860

## Texas

**Event:** Symposium, Demonstrations, Exhibitions, Trade Show, North Texas State University, Denton (June 14-16), American Assoc. of Woodturners, 667 Harriet Ave., Shoreview, MN 55126. Tel. 612-484-9094

## Washington

**Exhibition:** From the Woods (through August 18), Whatcom Museum, 121 Prospect St., Bellingham, WA 98225. Tel. 206-676-6981

**Shows:** Women Who Work Wood (through June 30) & David Gray/Perspectives (June 5-July 28), Northwest Gallery of Fine Woodworking, 202 First Ave. S., Seattle, WA 98104. Tel. 206-625-0542

**Symposium:** Use of the Lathe: Ideas for the Classroom, Redmond (June 21-23), Wood Turning Center, Box 25706, Philadelphia, PA 19144. Tel. 215-844-2188

## West Virginia

**Workshop:** Furniture Restoration (June 6-7, 17-18, July 29-30), Minuteman, Inc., 115 N. Monroe St., Waterloo, WI 53594. Tel. 1-800-733-1776

**Workshop:** Timber Framing, Door County (June 31-July 6), Riverbend Timber Framing, Box 26, Blissfield, MI 49228. Tel. 517-486-4355

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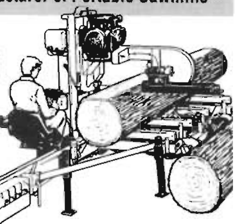

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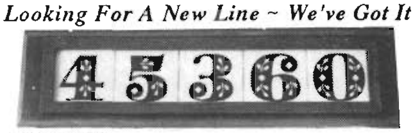

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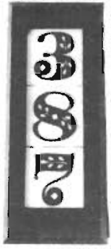

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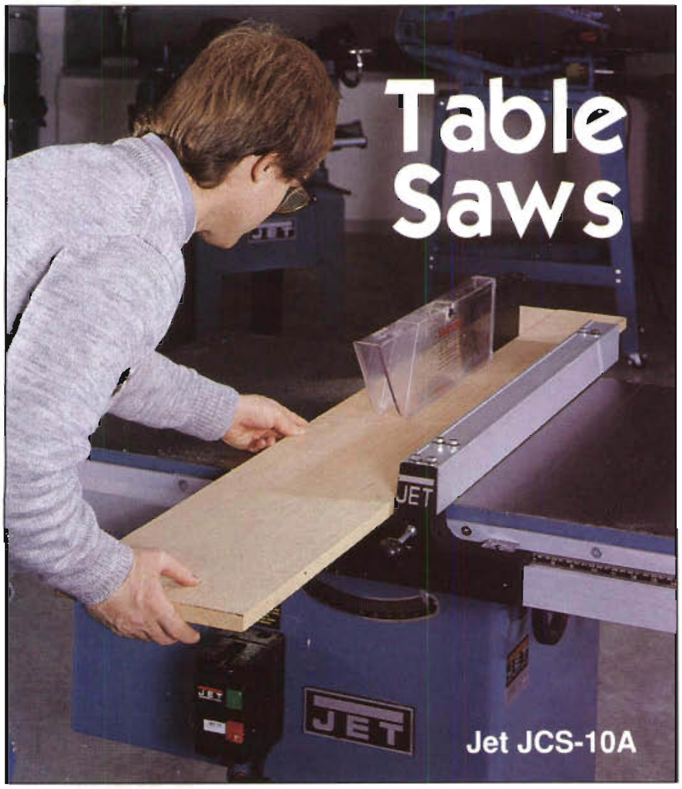
# TOOL TALK

BY SANFORD WILK



## The Early Days

Things have changed since the early days of table saw manufacturing. Originally you couldn't make table saws without using cast iron. The mass was required because of crude bearings and spindles, imbalanced motors and machining techniques that, in the beginning, lacked finesse. Without an extremely heavy base, these machines could literally vibrate themselves to death. Today's CNC machining means that a thoughtfully manufactured machine can eliminate the extra "mass for the sake of mass." Some manufacturers have stopped making cast iron tops and are using machined steel parts. These high–tech tops are lighter, yet just as precisely machined and they have less tendency to warp.

Forty years ago you needed three belts to drive a three horsepower saw. Today's belting technology has developed belts made of materials that reduce slippage, with pure seams and stronger reinforcement to prevent stretching. A manufacturer that buys from a reputable belt source need use only one belt per 10 hp. Anything else is overkill.

## Modern Times

We were faced with a dilemma when we started this article. Wanting to tell you about table saws, we realized that there are, in fact, three different levels of saws to discuss. One level—the open–based, "contractor's saw" includes the least expensive saws we tested. The next level up is the enclosed "cabinet saw" that is a shop standard throughout the country. And though your shop may not be ready for the third level—a big panel saw with a scoring blade and a sliding table, we thought you might like to read about testing one anyway. We chose one that provides good value for the cost.

Although the machines are built to meet different standards, we tried to test them all under the same conditions. The line voltage to all of the units was measured and kept within close tolerances, and thanks to Wisconsin Knife Works (2710 Prairie Ave, Beloit, WI 53511, phone 608-365-9581), we were able to test all saws using the same blade type.

Not every table saw made is included in our test. We chose the most common saws on the market, but some manufacturers who were asked to participate (Delta and Grizzly) declined for reasons of their own. Foley–Belsaw is currently redesigning their old model so they were not included. We eliminated direct drive saws from this comparison since we felt that portability was their only real benefit and that wasn't an issue here.

## What We Looked For

There are certain features on a saw that we feel are essential and should be basic to all units. The base should be sturdy and willing to support the constant strain and shifting that the top goes through during long, arduous cuts.

The motor should be powerful enough to allow you to use the saw in the spirit of the machine's overall design without sacrificing the quality of the cut. Don't buy a 500 lb machine that has only a 1 hp motor. Common sense will tell you that a big machine requires a big motor.

The fence and tabletop are also critical considerations. The rip fence should hold its set position without any drift, but it should also glide easily to that position. Since they receive a lot of handling, you'll want a rip fence that can readily be adjusted for changes in parallel and locking pressure. A good tabletop should feel smooth to the touch and should, of course, be perfectly flat. T–slots for the miter gauge are the best way to go; you have more control than you would with square–bottomed slots.

## General's Model 350-1

The 350-1 is, in our opinion, the finest saw made in terms of workmanship. One may not always agree with the design of certain features, but you can't criticize the machining or assembly. Speaking of assembly, this unit comes fully assembled. The motor, belts, pulleys, extension wings, etc. were already in place; all the tester had to do was install the fence and he was ready to run. Some of the saws we tested took up to five hours to assemble and fine tune, so we really appreciated General's policy of sending out assembled machines.

Working your way from the bottom up, the first thing you'll notice about this saw is a very sturdy, enclosed–cabinet type of base with a dust collection chute that runs out the side. Dust collection is an important consideration, not just in terms of protecting your health, but also because the extremely fine particles produced by a table saw can ruin a home's heating system.

Still further up the base, you'll find a magnetic starter. This kind of starter provides overload, no–voltage and low–voltage protection. If you lose power during a cut, you won't be surprised by the

---

***Sanford Wilk** a builder and organic architect in Boston, Massachusetts, heads a team of craftsmen who evaluate tools under actual working conditions.*

General 350-1

saw activating again once the power is restored; before it does, you'll have to restart it.

When you reach the tabletop, you immediately notice the machining I mentioned earlier. One tester commented that it was "as smooth as a baby's bottom," and indeed it is.

This quality machining carries over into the T–slots for the miter gauge. The Hitachi unit below was the only other saw that had such close tolerances—no side–to–side movement but easy forward/backward movement. The other important feature of the General's tabletop is that the insert can be leveled. This helps to keep stock from getting hung up around the blade area.

The fence on the General moves freely, retains its position and is easily read, but we felt that such a wonderful piece of equipment deserves to come standard with a top–of–the–line fence, like the Biesemeyer or Excalibur fences.

The saw can be ordered with a few different motor options; our test unit included a single–phase, 220–volt, three hp, ball-bearing motor which had more than sufficient power for all our test runs. When considered side–by–side with the other machines we tested, the General rated extremely well. Though we're not really comparing apples to apples, we would say that the General is a good deal for somebody looking to purchase a closed–base saw with standard features (General Manufacturing Company, Ltd., 835 Cherrier Street, Drumondville, Quebec, Canada J2B5A8, phone 819-472-1161).

## Hitachi's Model C 12Y

The enclosed base on this machine is extremely sturdy, and includes a dust–collection chute. Some assembly is required. Hitachi incorporates a magnetic starter for basic safety and convenience as well as a commutator motor. The motor isn't dual–voltage, and you must specify the motor you want at the time you order the machine. Ours was a 110–volt, three hp powerhead. It could easily handle all the test cuts we made with it, but boy, was it noisy!

The built–in blade brake is unique among the saws we tested. It's not an electric brake; it's a lever at the front of the cabinet that you lift to stop the arbor after turning the machine off. Another nice feature that the other saws don't have is a hole in the tabletop that accepts a pin to lock the arbor for blade changes.

The tabletop is beefy and well made, boasting T–slots as accurate as those on the General. The table insert is of the screw–down variety, and though it's not adjustable, it's well machined and perfectly flush with the table's surface.

Hitachi C 12Y

The saw's fence has a micro–adjustable dial that makes minute side–to–side adjustments easier than trying to "bump" the fence into position. This is a pretty common feature among the saws we tested; what's unique about Hitachi's fence is that it can be locked at the front and the back separately. This helps to eliminate any deflection that might occur and our testers took a real liking to it. This, too, is a good choice for a closed–cabinet saw. Now if only Hitachi could work on the motor noise... (Hitachi Power Tools USA, Ltd., 4487-E Park Drive, Norcross, GA 30093, phone 404-925-1774).

## Jet's Model JCS-10A

This unit was a shocker for our testers. We didn't expect such a nice saw from an importer. It's a closed–cabinet style unit with a base that has a dust chute, and is extremely well made.

The starter is magnetic and the cranks worked with minimal effort. As far as tabletops go, the grinding on the Jet unit was flawless—close in quality to the expert machining evidenced on the General. The insert can be leveled, and unlike most manufacturers, Jet includes a dado insert (also levelable) for free. The table does incorporate T–slots but they had a little play in them. Though the motor was only a two hp unit (220–volt), it had plenty of power for all of the cuts we made.

The fence slid along a front rail that made movement and adjustment quite nice, despite the lack of a micro–adjustment knob or a lock to grip the rail at the back. We had trouble reading the scale because the indicator is suspended over it and the space in between allows visual deflection. But it is a lift–away fence that doesn't need to be dragged to the end of the rails to be removed.

All in all, dollar for dollar, this saw is hard to beat for those on a tight budget (Jet Equipment and Tools, Inc., 1901 Jefferson Avenue, Tacoma, WA 98401, phone 206-572-5000).

## Lobo's Model HTS 012

This closed–cabinet saw came to us with a few handicaps. The base is relatively light–duty, and the paint was put on *over* rust. We weren't too happy about that, but I'm afraid it gets worse.

Though the magnetic starter seemed fine, one of the two belts on the machine seemed stretched and might have been the wrong size. The motor is a three hp, 220–volt, single–phase powerhead that handled the stock tests without complaining.

We wish that more care in engineering and construction had been taken with the table. Its wings looked like they never made it through the finish grind, since they were about .04" to .05" higher than the table and had a very rough surface. There was no way to lower the wings (they were already adjusted all the way down), so we had to send them to a local machine shop just to get them flush with the table!

The insert was another disaster. The slot was cut into it kind of cockeyed, so the blade nicked it when it first started up. Once the blade had cut the slot to fit, we were still a bit nervous about having the insert so close to it.

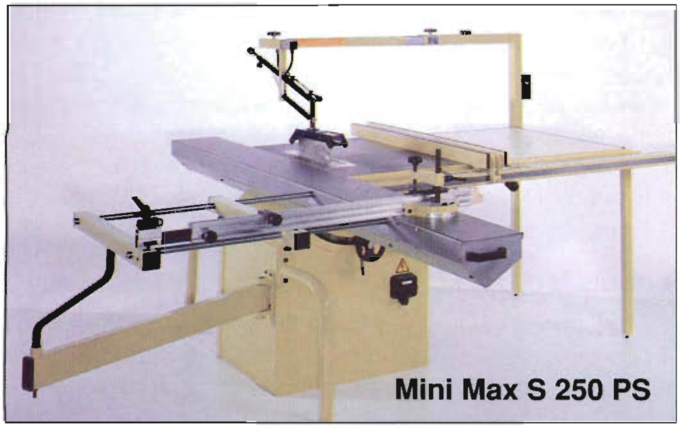
We were surprised to discover that the rip fence was fairly accurate. It has a micro–adjustment knob. The scale on the fence is engraved into the tube the fence slides on; it would be a lot easier to read if the markings were painted to contrast with the tube (Lobo Power Tools, Inc., 9034 Bermudez Street, Poco Rivera, CA 90660, phone 800-786-5626).

## Mini Max's Model S 250 PS

We chose this machine to represent the high end of table saws. It lists for almost $3000, and most distributors don't discount that number. Now I know you probably just cringed, but keep in mind that the General and the Hitachi are both over the $1600 mark. Also try to keep in mind that the features found on this *incredible* saw are equivalent to those found on saws that cost thousands more.

Working from the bottom up again, the base is sturdy and has stabilizer legs at the front and the back of the table to the left of the operator, to offset any cantilever introduced by processing a large panel on the sliding table. Mini Max spared no expense here, and both the base and the legs are finely machined. There's also a sliding table support wing that pivots around a connection on the base making the sliding table so strong you can sit on it. The base also incorporates a dust collection chute. We should mention that this tool weighs roughly 100 pounds more than the other cabinet saws.

The motors (one for the scoring saw and one for the larger blade) are among the finest we've ever seen. The large one is a three hp, single–phase, 220–volt powerhead, and the smaller, scoring saw motor was a high rpm unit that ran off the same 220–volt power supply.


Mini Max S 250 PS

The scoring saw is in line just before the larger blade, and works independently of it. You can selectively raise or lower either one, and you can run the larger blade while the other is silent. The scoring blade runs in the opposite direction to the main cutting blade producing chip–free cuts in panels. The scoring blade is only for breaking the surface (its maximum cut is about 1/4"), but the effect created when the two blades are working in harmony is nothing less than excellent. If you use veneer plywoods or plastic laminates, this scoring feature alone could well pay for the extra cost of the saw since you'll spend a lot less time dealing with splintering.

The tabletop consists of two separate realms. The stationary top is nice and flat; though it's not cast iron, it's almost as smooth as that on the General. The only complaint we had about the top (and the saw as a whole) was its lack of miter gauge slots. It does have full miter capabilities via the other realm—the sliding table, but the slots might be useful for some jigs. Featherboards and tenoning jigs that normally would fit in the miter gauge slot won't work here. Don't get me wrong, the sliding table outperforms any miter gauge on any saw; we just wish that this full–feature saw had two simple slots in its table to accommodate some jigs.

One of the nice things about this saw is that it's truly a one–man saw. A guy that needs to handle a full sheet of plywood and doesn't have a helper, can accomplish the job by himself. No more cutting a full sheet down with a circular saw prior to putting on the table saw. The sliding table even incorporates stops and a scale that makes repetitive work go a lot faster.

The table insert is levelable, but the company doesn't make a dado insert. You can make your own out of wood, or buy the regular insert and do what we did; send it to a local machine shop for a 1" internal slot.

The Mini Max saw came to us with a Model 50 Biesemeyer T–Square™ fence which took some effort to assemble. After assembly, however, the fence aligned beautifully, and it proved to be the most accurate of any of the test units' fences. The scale read as clear as a bedtime story and even though it only clamps at the front, it was still the sturdiest fence going (SCMI, Mini Max Division, 5933 Peachtree Industrial Boulevard, Suite A, Norcross, GA 30092, phone 404-448-1120).

## Nu–Mark's Model 30-330

This saw is new to Nu–Mark, and it's an enclosed cabinet saw with a two hp, single–phase, 220–volt powerhead. It's a 12" saw so the cutting capacity is larger than most others (except the Hitachi and the Lobo which are also 12"), and we couldn't slow it down.

The Nu–Mark's base is a good one, not as classy as the Jet, but a lot better than the Lobo. Unfortunately, it lacks a dust chute. You have to clean out the cabinet interior through a small door at the foot of the base. The cranks turn smoothly, and the starter is magnetic.

The tabletop, however, came to us a real mess. In all fairness to Nu–Mark, this machine was their first shipment from Taiwan, and they didn't even get the chance to examine it before sending it out to us because we were in such a hurry. The top wasn't like the Lobo's top; it was machined well, but it was coated with a thick, hard goo that resembled polyurethane. The tester literally spent hours cleaning the top off.

The miter gauge slots are not T–slots. The insert isn't of the

Nu–Mark 30-330

Powermatic 63A

leveling variety, and it's only held in place by two screws. It sits below the table surface, and we had to shim it up to keep the material from getting caught. The fence is basically identical to the one on the Lobo. It's not a bad fence, but it's not the best either.

This saw was one of only two saws tested (Sears was the other) where the blade tilts away from the fence instead of into it. This is an operator preference issue; it complicates some cuts (like cutting the shoulders on raised panels) but some feel that it's safer than having the blade tilt towards the fence.

While it's not as nice as the Jet and not as poor as the Lobo, this saw is not a bad example of a Taiwanese import. I like this company because like Jet, they are geared towards the end–user. I have great doubt that Nu–Mark will let these faults slide by (Nu–Mark, Incorporated, 13306 West 99th Street, Lenexa, KS 66215, phone 800-248-4799).

## Powermatic's Model 63 Artisan™ Saw

The Model 63 is another machine that's made in Taiwan. In fact, it comes out of the same plant as the Tradesman model discussed below. In the end, though, it's not the same saw since Powermatic makes a few adjustments to the Taiwanese attitude.

The base is of the four–legged, open design and though it lacks the bulk and weight of an enclosed cabinet saw, it's still pretty sturdy. Just don't expect to run a large sheet of plywood through without roller stands—it might tip over. Dust collection on this saw is made possible by a plastic cowling that surrounds the blade and sends dust into an exit port for collection. This unique method seems to work *well.*

The starter on this and other contractor's type saws is non–magnetic since the motors are capacitor–start units. The switch is a toggle switch, so you lose the extra level of protection that magnetics offer. The motor is a 1 1/2 hp, dual–voltage powerhead, and we recommend that if you have 220–volt power available, use it for the sake of cutting down the amperage draw. The cranks that come standard from Taiwan were replaced with the metal variety by Powermatic, and they work extremely well.

The miter gauge slots in the tabletop are the T–slot type, and the insert is levelable. Some of the testers didn't like the open (grate) style extension wings, because inexperienced operators sometimes get their fingers caught in the slots. It's never happened to me, but I'm told that it's not fun.

The fence on the model 63 is specially designed for Powermatic by Vega. The fence itself is extruded aluminum, and it's a lift–away type that locks only at the front. It has a real nice micro–adjustment feature with a fine–tooth wheel enabling closer tolerances to be achieved with greater speed. Working in conjunction with that adjuster is a hairline pointer that sits right above the scale and makes for easy reading. The fence also has a built–in push stick that rides in an aluminum channel and transfers about 30% of the forces moving in the forward direction into force in the downward direction. There's also a stop block for repetitive crosscuts built into the fence system. Our one criticism of the fence is that you cannot attach an auxiliary fence unless you drill out and tap the extruded aluminum. Nonetheless, the Vega fence system is unique and it adds flavor to this imported saw.

If you're looking for a contractor's saw, then look no further (Powermatic Division of DeVlieg–Bullard, Inc., Morrison Road, McMinnville, TN 37110, phone 800-248-0144).

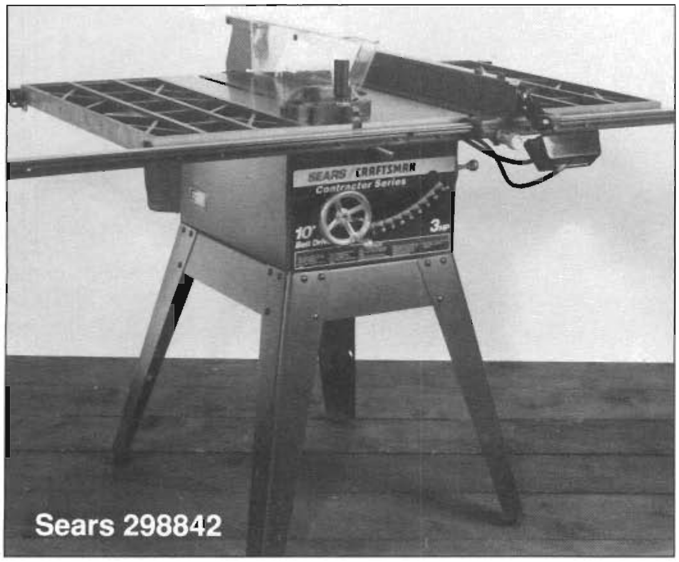
## Sears Model 298842

This is the top of the Sears line in terms of open–base table saws, and we have some nice things—and some not so nice things—to say about it.

Once again starting with the base, we hit a bad point. The legs are way too flexible—so much so that the tester had to fabricate a bottom brace before we could properly test the machine. The manufacturer is designing a dust collection system for the saw that should be available in August.

The metal cranks turned smoothly, and like the Powermatic, the motor is a 1 1/2 hp, dual–voltage, capacitor start unit, so the switch is just a toggle. The front of the machine claims that the saw *develops* three hp, but this is just a numbers game some manufacturers use to confuse consumers. The inner workings say 1 1/2 hp, and that's what it is.

The blade, like the Nu–Mark's, tilts away from the fence; you have to decide if that's appropriate for you. The miter gauge slots are not T–slots; the insert, however is levelable. The extension wings, like those on the Powermatic and the Tradesman, are of



Sears 298842

Tradesman 8000A

the open–grate variety. One of ours was warped, but that brings up a good point about buying Sears tools; you can take faulty products back to any Sears store and get them replaced.

The fence on this contractor's type saw isn't very heavy–duty, but it surprised us in how well it maintained accuracy. It locks at both the front and back, yet it's also a lift–away unit. The scale is very visible and easy to read.

This saw offers the woodworker the option of a frugal price combined with some workability. It does the job, and we couldn't stop it or slow it down (Sears stores throughout the United States).

### Power Tool Specialists' Model Tradesman 8000A

This saw is from the same Taiwanese plant as the Powermatic Model 63 Artisan™. Among the differences between the two machines are the lack of a dust collection port, plastic (instead of steel) cranks and miter gauge slots that aren't T–slots.

The major difference is the fence. In short, this saw has on it what Powermatic probably sends to the scrap *bin. It's* a formed–steel fence that rides a tubular rail with a scale that's somewhat illegible. We had a tough time keeping it parallel to the blade.

The extension wings, motor, tabletop and stand are all the same as on the Powermatic, but the Taiwanese handicaps that Powermatic removes are still built into this saw.

I like this Connecticut–based company, and I wish we had something nice to say about this saw, but with the availability of the Powermatic, only an uninformed buyer would purchase this unit over the Artisan™. True, there is a difference of a few hundred dollars between the two, but don't be pennywise and pound foolish (Power Tool Specialists, Inc., 3 Craftsman Road, East Windsor, CT 06088, phone 800-243-5114). PW

**Table Saws**

| Machine Tested | Horse Power | Volts | RPM | Blade Diameter | Table Size | T–Slot | Rip Capacity Left/Right | Fence | Weight | List Price | Rating 1-10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| General 350-1 | 3 | 230 | 4,000 | 10" | 28" X 36" | yes | 15½" 25" | formed steel | 415 lbs | $1,595 | 9 |
| Hitachi C 12Y | 3 | 115[1] | 3,800 | 12" | 27¼" X 36¼" | yes | 15½" 25" | cast iron | 330 lbs | $2,556 | 9 |
| Jet JCS-10A | 2 | 230 | 3,400 | 10" | 27" X 40" | yes | 12" 30" | extruded aluminum | 353 lbs | $1,199 | 9 |
| Lobo HTS 012 | 3 | 230 | 3,450 | 12" | 27" X 36¾" | no | 15" 25" | extruded aluminum | 330 lbs | $789 | 4 |
| Mini Max S250 PS | 3 | 230 | 3,500 | 10"[2] | 22" X 33" | no slots[3] | 12" 50" | Biesemeyer | 490 lbs | $2.995 | 10 |
| Nu–Mark 30-330 | 2 | 230 | 3,450 | 12" | 27" X 40" | no | 15" 25" | extruded aluminum | 402 lbs | $1,095 | 7.5 |
| Powermatic 63A | 1.5 | 115/230 | 4,500 | 10" | 27" X 40⁹⁄₁₆" | yes | 12½" 26½" | Vega | 240 lbs | $964 | 8 |
| Sears 298842 | 1.5 | 120/240 | 3,833 | 10" | 27" X 44" | no | 24" 24" | formed steel | 238 lbs | $499 | 7 |
| [4]Tradesman 8000A | 1.5 | 115/230 | 4,500 | 10" | 27" X 40⁹⁄₁₆" | no | 10" 27" | formed steel | 230 lbs | $699 | 6 |

[1]can be ordered with 230v motor/starter [2]plus 4" scoring saw [3]sliding table [4]prototype unit

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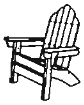

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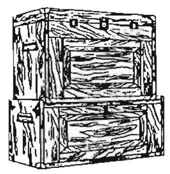

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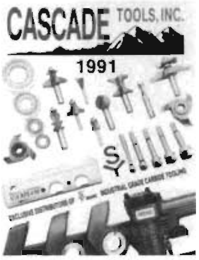

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# Eastern White Pine

**by Ken Textor**

Few woods have a more colorful history than Eastern white pine. King George tried to reserve it exclusively for the Royal Navy during the American Revolution. Pine was one reason why Maine separated from Massachusetts in the early 1800's to become "The Pine Tree State." As a readily available and versatile material, white pine was essential in developing the industrial heartlands of the Northeast and Midwest.

It's virtually impossible to live a woodworker's life amid sawdust and shavings without coming across white pine. Architects, furniture designers, pattern makers, boat builders and a host of others designate white pine as a primary material. And there are plenty of good reasons for all the attention paid to this humble softwood.

## General Description

At least a dozen different species are called pine (ornamentals account for many more) and regularly milled into lumber. But only Eastern white, *Pinus strobus*, still enjoys the wide use which has characterized it since the 1600's. Western white pine, southern pine and several other species don't have quite the versatility and range of working properties as Eastern white, though they do have other desirable properties that Eastern lacks.

White pine lumber is readily identified by its cream-to-white sapwood surrounding the light brown heartwood, which may also be tinged with slightly reddish hues. These colors will all darken significantly on exposure to sunlight.

And then, of course, there are the knots—generally dark brown spots with their own annular rings separate from the main body of wood. They range from circles the size of a dime to large elongated ellipses configured like long-tailed comets or galaxies out of control. They may have dark gray or brown stains around them. Exactly which type of knots you get, how many, and the degree of staining depends on the grade of wood you buy. More on that later.

Both the strength and weight of Eastern white pine are relatively light—roughly half that of a hardwood like white oak. Compared to most other softwoods, though, it's only slightly less strong and heavy. Knots can significantly affect the strength, however, particularly those long comet-like spikes that sometimes run across an entire board. Such knots can weaken the lumber enough to render it useless.

Rot resistance is about average in the heartwood, but the sapwood has negligible resistance, particularly in situations of continuous wetting or slow drying. That's why white pine doesn't always make the best house siding. Even on the north side of a building surrounded by wind-cutting shade trees, white pine boards might not last more than 20 years.

But its other uses are manifold. As a trim wood, it has a long history. Knotty lumber is turned into tongue-and-groove paneling, ceiling boards and even exposed carrying beams and posts. Clearer lumber is used in door and window trim, shelving, built–ins and cabinets, crown and scotia mouldings, door and window sashes, caskets, toys, slack cooperage, inexpensive furniture and patterns for foundry work.

## Working Properties

The wood is generally easy to work, but has some pitfalls. Planing is usually problem-free due to its softness and straight grain. But with the lower, very knotty grades, you'll get some grain reversal, particularly around large knots. This usually results in raising the grain a bit and perhaps some minor chipping. Try a slow run through the planer, taking as little as $\frac{1}{16}$" off.

Turning and sanding white pine present more serious problems. Unless you turn your lathe at higher-than-normal speeds, use very sharp cutting tools and take tiny amounts of wood at each pass, you may get seriously raised grain at best, chipping and gouging at worst. Only absolutely clear straight-grained lumber has a chance of giving satisfactory turning results.

Sanding is made difficult by the wood's varying hardness. It's easy to create dips if you're using a large, heavy belt sander, because the knots are much harder than the surrounding wood. They become high spots while the wood around gets sanded away. The best solution is to use an orbital sander throughout. For best results, the final paper should be at least 220-grit.

White pine does tend to bend fairly easily, but this property is of marginal use these days. Years ago, virgin growth Eastern white pine had a much greater concentration of heartwood and closer annual rings, due mainly to slow growth in climax forests. The wood then was stronger and more rot–resistant. Add to that its bendability and you have a timber that boatbuilders—including King George's navy—favored for planking *and* spars. But today's more quickly grown second and third growth lumber rots easier and lacks the strength of its predecessors.

Fastenings do not hold very well in Eastern white pine, particularly nails. Screws work better, but often aren't satisfactory in free-standing furniture. Therefore many projects that specify white pine recommend the "glued *and* screwed" approach. The one exception is nailing or screwing into knots, which tend to be very hard and hold fastenings very well—once you get the fastener in. Pilot holes are usually required.

Gluing white pine is a simple pleasure.

***The decorative pine bucket in the photo below has a clear wax finish.***

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***Ken Textor** is a woodworker and writer in Arrowsic, Maine.*

Both resin and epoxy glues work well, the latter usually requiring grooves so the joint doesn't get glue-starved. Knots, however, may prevent glue from sticking well. The only solution is to avoid them at glue joints.

Knots also present one final problem in all projects—shrinkage. Eastern white pine's knots tend to shrink at a rate greater than the surrounding wood. This can cause warping in projects during very dry times of the year. Clear pine, however, has very little overall shrinkage and is noted for its dimensional stability.

## Finishing

A big advantage to Eastern white pine is the ease with which it takes paints and stains. Regardless of the type of finish you apply, there is a risk that knots and sap pockets will bleed through. This can be prevented, however, by pre-painting knots and sap pockets with shellac. If you do this, feather the edges of the dried shellac with 220-grit sandpaper. That way you'll eliminate the possibility of a slightly raised spot showing when you apply the paint.

***This pine cabinet has been stained walnut and finished with polyurethane.***

Staining is even easier since many manufacturers use white pine to color-key their products. Thus your white pine projects get a stained wood color very true to the representations on the can or color chart. Varnishing and other clear finishes work fine, too. But remember that the natural yellowing or browning of many urethanes and varnishes, combined with pine's tendency to darken over the years, will result in a finish several shades darker than freshly planed pine boards.

## Availability

Eastern white pine is widely available anywhere north of the Mason-Dixon line and east of the Mississippi. It's readily available in all forms of mouldings, plain boards, shiplap, tongue-and-groove, beaded matched boards, timbers, plywood, veneers and four-sided stock of various dimensions. Boards up to 18" wide are often available, too.

The key to selecting pine is in the grading. Unfortunately, no standard system is used everywhere. The Department of Agriculture has a system for grading pine and other species, and has tried for years to implement it, but many lumber yards simply ignore it and use the system "we've always used." Here's a general system, allowing for local variations, that many woodworkers, contractors and architects use:

**Clear, #1, or select**—the best grade of pine is identified by any of these names. Clear means what it says—no knots, sap pockets or other anomalies. It may, however, be hard to find, so sometimes it's wise to accept a board as clear even though it may have a dime-sized knot or a 1/8" X 2" sap pocket somewhere in the middle of everything. Expect to pay dearly for this grade, from $2 to $4 per board foot, depending on how it was milled.

**Seconds, #2, or #2 clear**—this grade is much easier to find and cheaper than clear, but you'll have to put up with a few more knots. They should be small, no larger than a quarter, and well spaced, averaging no more than about one per foot. The price will be easier to bear, somewhere between $1.50 and $3.

**Construction or #3**—this is the grade that's easiest to find. It's usually used as siding underneath a structure's finish siding, but can also be found in matched boards used for interior finish work. Many people incorrectly call it "knotty pine," but that's a good description of what you'll see. The knots, however, should adhere tightly to the surrounding wood. They should also be no bigger than 2" in diameter and spikes should not run completely across a board. Expect to pay from $1 to $2 for this lumber.

**Utility, #4, or Rough & Random**—these are useful as exterior sheathing but not for much else. Knots can be huge—4" or more—as well as loose and unsound. A board may run completely clear for a few feet, so it can be useful for small projects. But for larger ones, you'll have to contend with knots and sap pockets galore. The price is attractive—unplaned boards were selling in Maine recently for as little as thirty cents per board foot—although the price may go as high as $1.25. PW

## Out of the Woodwork

by Mike Dykes

# Tool Moochers

Blam! There goes another one, wasted on the battlefield outside my shop door. Boom! Another creep bites the dust. I know I can count on artillery support and my trusty flamethrower.

After all, the woodworker's enemy is out there, lurking in the weeds, ready to wreak havoc on my very life if he gets past the perimeter!

Rambo feelings aside, I've had it with the onslaught of people who want to take what I have sworn to defend: my tools!

I have a sign on the outside of my shop. I put it there. I meant it. People seem to pretend either that it doesn't exist or that I didn't know what I was doing when I took such pains to buy it and then nail it where no one could possibly miss it.

"No tools loaned. Don't even bother to ask!"

People bother to ask. I can threaten the potential borrower with the world's nastiest wrestling hold—the lip stretch—but still it will not persuade him to buy his own tools, when he can filch off with mine!

I keep thinking about barbed wire, a well guarded mine field. Big, nasty dogs. Anything!

Nothing seems to work.

What gets on my nerves is that whenever I loan a tool out, it goes through the roughest service the borrower can devise. Then, when he brings it back with the teeth broken out of the blade, the carbide knocked out in huge chunks, and the cord clumsily patched with cheap masking tape (where the yo-yo cut the power line), he gives me a sing-song "Thank you," and doesn't bother to make the defects right.

*I* don't try to chop the heads off nails with my fine finish saw blades. Everyone else does.

That's why I don't loan tools out any more.

**"I'm through using the planer!"**

But what do you do with the family member who wants to repair a table that his great–great fourth cousin–in–law (nine times removed) left to his daughter–in–law after the kids get married?

One thing that comes immediately to mind is to make excuses. I don't care if I am using a brand new heavy duty drill, straight out of the box. If *he* wants to borrow it, the poor tired old thing is on its last legs and may not survive another hour of light use.

Or I sometimes say that I never use that blade for cutting anything but laminated Bubinga with rose hip tea dripped all over it for "special" lube. Just my luck, that's what he'll be cutting.

Sometimes, people want to borrow the entire shop—just pull their semi full of particle board "antique" furniture in, have me shut down on all my paying customers, so they can work on things at their leisure.

Somehow, I manage to find something that'll keep me busy. And I'm always so sad that because of it, they can't use the shop, say, until they're dead and buried (and if they ask once more, that may be at the end of the week).

I don't let it get me down, though. I mean, what would life be if there weren't obnoxious Bozos trying to borrow my tools all the time?

The question is not rhetorical. I'd really like to find out!

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*If you'd like to borrow* ***Mike Dyke's*** *tools, you'll find his shop in Lacey, Washington.*

A guy walks into a lumberyard and says to the clerk, "I'd like to buy some four–by–twos." The clerk looks puzzled, "You mean two–by–fours?"

"Hang on, let me go ask my partner." He goes out to the truck and then comes back in a few minutes later. "Yeah, you're right, we need two–by–fours."

"How long you want them?" asks the clerk.

"Let me go check." He goes out and talks to his partner; then he comes in and says, "We're building a house; we'll need them for a *long* time."

—Dave Newell, Benicia, CA

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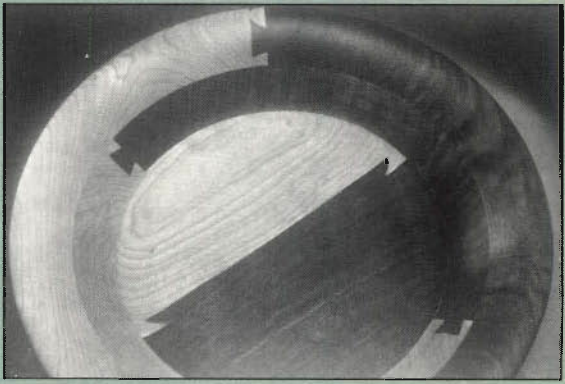

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